EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-01

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013 Base Option Period Number 1	Optimization Model for reducin

Contractor: ICF INCORPORATED, L.L.C.

Specify Section and paragraph of Contract SOW: Task 2f

Purpose:
- ☒ Work Assignment
- ☐ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 10/01/2012 To 09/30/2013

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 02/01/2012 To 09/30/2013		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Ari Kahan (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4260 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: Jose Ortiz (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2831 FAX Number: 513-487-2109
Contracting Official Name: Sandra Savage (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2046 FAX Number:

STATEMENT OF WORK	EPA Contract EP-C-12-011
WORK ASSIGNMENT	1-01
A. Issuing Office:	Environmental Protection Agency 2000 Traverwood Dr. Ann Arbor, Michigan 48105
B. Contractor:	ICF International 9300 Lee Highway Fairfax, VA 22031-1207
C. Statement of Work:	Optimization Model for reducing Emissions of Greenhouse gases from Automobiles (OMEGA)
D. Project Officer	Greg Janssen 734-214-4285 734-214-4821 FAX Janssen.Greg@epa.gov
E. Work Assignment Manager (WAM)	Ari Kahan 734-214-4260 Kahan.Ari @epa.gov
Alternate WAM	Jeff Cherry 734-214-4371 Cherry.Jeff@epa.gov

BACKGROUND

As part of the Office of Air and Radiation, EPA's Office of Transportation and Air Quality (OTAQ) administers portions of Title II of the Clean Air Act, as amended in 1977 and 1990. Within OTAQ, the Assessment and Standards Division (ASD) does a wide range of work in support of EPA's efforts in air quality analysis. These efforts include creating and revising emissions estimation models and other tools, developing regulatory impact analyses, testing vehicles, supporting the vehicle inspection and maintenance programs, and other related projects.

Onroad vehicles represent the largest portion of the nation's petroleum consumption and a very significant portion of the nation's total fossil fuel consumption. As such, onroad vehicles are significant contributors to the nation's greenhouse gas (GHG) emission inventory. Reducing these emissions will likely be a necessary part of any program aimed at

controlling the nation's total contribution to global warming. The Clean Air Act specifies that determining an appropriate level of control of these emissions requires an accurate assessment and consideration of both the costs and benefits and due consideration of the leadtime necessary to implement such emission controls and their incorporation into the onroad vehicle fleet. The wide variety of onroad vehicles and the range of available emission control technologies necessitate that any such assessments must be automated.

The current version of EPA's Optimization Model for reducing Emissions of Greenhouse gases from Automobiles (OMEGA) was developed under several work assignments in the EP-C-06-094 and EP-C-12-011 contracts. The current model provides a broad set of calculations to support the reduction of on-road GHG emissions as described above. The model analyzes vehicle technology cost and effectiveness, as well as the benefits and impacts of potential programs.

PURPOSE OF THE WORK ASSIGNMENT / TASKS

The purpose of this work assignment is to fix elements of the current version of OMEGA that are not working as intended, to improve the operation of the core model, to further develop the input and output files, to update the documentation, to integrate the OMEGA consumer choice module, and provide for uncertainty analysis in the model. The Contractor shall design, develop and test the model with the new capabilities in the tasks outlined below.

Task 1:
The contractor shall modify OMEGA so that the program can model relevant mobile source GHG regulations. This may include adding additional program features in order to reflect draft regulations. The contractor shall update the core model code as provided in written technical directives by the EPA Work Assignment Manager (WAM) to properly account for technology cost and effectiveness calculations. This may include modifying core algorithms of the model, the methodology used to apply technology, integrating additional modules, or other changes. The contractor shall fix any program bugs as needed.

Task 2:
The contractor shall continue to improve the layout, structure, and content of the input and output files with written technical direction from the EPA WAM.

Task 3:
The contractor shall update the Programmer Guide to include a full description of the layout of the program, including definitions of the objects, and how data gets transferred between different parts of the program code. The contractor shall provide additional model documentation as requested in written technical directives by the EPA WAM.

Task 4:
The contractor shall modify the program interface as provided in written technical directives by the EPA WAM.

Task 5:
The contractor shall continue to develop an iterative automated interface between OMEGA and the OMEGA consumer choice module through written technical directions from the EPA WAM. This may include modifying the OMEGA model, the OMEGA consumer choice module, or integrating the models. The contractor shall make other maintenance, bug fix, and feature changes to the OMEGA consumer choice model as provided in written technical directives by the EPA WAM.

Task 6:
The contractor shall modify the model to aid in uncertainty analysis. This shall include tools to prepare, process, collate, and summarize inputs and outputs.

OTHER TERMS AND CONDITIONS

Confidentiality:
The Contractor shall not divulge any information acquired in the course of the work assignment with respect to data, output, EPA file structures, data processing activities or functions, user ID, passwords or any other knowledge that may be gained in the course of this work, to anyone who is not authorized by EPA to have access to such information. Also, due to the sensitive and sometimes confidential nature of the information processed, Contractor personnel shall sign appropriate confidentiality agreement forms, and shall be briefed as to which information requires special handling.

Non-Disclosure Agreement:
All documentation and work product provided by EPA or generated as a result of this project shall be under the control of the Assistant Administrator for Air and Radiation, or his or her designated representative, and shall not be released by the Contractor to any other source without specific approval by US EPA.

DELIVERABLES

All deliverables shall be accurate and of professional quality and shall meet the requirements set forth in this WA/SOW and in the specific description of their attachments. The contractor shall work within the framework of this SOW, and shall comply with its requirements. The Contractor shall provide all source code and data tables used to develop specific applications. All products developed under this WA/SOW are the property of the US Environmental Protection Agency.

1. The contractor shall provide weekly meetings or email updates with the EPA WAM, as needed, to discuss WA tasks and progress.

2. The Contractor shall provide the EPA WAM with a running-and-under-development version of the model. EPA expects that modifications to the model may occur on a bi-weekly or monthly basis. The contractor shall provide the EPA WAM with updated versions

of the model after each task has been completed. EPA will continue to own the OMEGA model.

3. The tasks shall be delivered to the EPA WAM along with an updated version of the model including updated versions of the following, as necessary: Test documents and test results, the source code, executable applications/programs, and the instructions/mechanism for compiling the source code files and generating executables.

4. At the end of the performance period, the Contractor shall provide the EPA WAM with an updated version of the model including a Programmer Guide, test documents and test results, the source code, executable applications/programs, any specialized testing suite used to validate/error check the software, and the instructions/mechanism for compiling the source code files and generating executables.

Task Completion:
Each Thursday of the work period the contractor shall report the percentage of the level of effort expended, percent of the task completed to date and any problems to the Project Officer, or alternatively to the Work Assignment Manager, via telephone or email. On the Thursday following the close of each biweekly accounting period, the percent of level of effort shall be based on the results of such accounting. On alternate Thursdays, a reasonably accurate estimate shall suffice.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-02

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013	Uncertainty Analysis of Biofue
	Base Option Period Number 1	

Contractor: ICF INCORPORATED, L.L.C.

Specify Section and paragraph of Contract SOW: Tasks 7 and 9

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 03/27/2013 To 09/30/2013

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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Authorized Work Assignment Ceiling

Contract Period: 02/01/2012 To 09/30/2013 — Cost/Fee: — LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: — Cost/Fee: — LOE:

Cumulative Approved: — Cost/Fee: — LOE:

Work Assignment Manager Name: Aaron Levy (Signature) (Date)	Branch/Mail Code: Phone Number: 202-564-2993 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Sandra Savage (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2046 FAX Number:

WORK ASSIGNMENT 1-02

Title: Uncertainty Analysis of Biofuel Lifecycle GHG Emissions

Contractor: ICF **Contract No.:** EP-C-12-011

Work Assignment Number: 1-02

Estimated Period of Performance: 3/27/2012 to 9/30/2013

Estimated Level of Effort: 550 hours

Key EPA Personnel:

Contracting Officer (CO):

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Project Officer (PO):

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Work Assignment Contracting Officer's Representative (WA COR):

Aaron Levy
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Alternate WA COR:

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Email: camobreco.vincent@epa.gov

I. Background and Purpose:

Pursuant to its responsibilities under the Energy Independence and Security Act of 2007 (EISA), Renewable Fuels Program (RFS) provisions, EPA undertakes lifecycle assessment of the greenhouse gas emissions associated with different types of renewable fuels. As directed by

EISA, this analysis addresses the full fuel lifecycle of biofuels, including all stages of production, distribution and consumption. A key piece of the analysis, as directed by EISA, is inclusion of significant indirect effects, such as indirect land use change impacts associated with producing biofuel feedstock. EPA's approach is to use the best tools and models available to estimate GHG emissions related to each component of the fuel lifecycle.

While EPA believes the lifecycle methodology developed for the March 2010 RFS2 final rulemaking represents a robust and scientifically credible approach, EPA recognizes that some calculations of GHG emissions are relatively straightforward, while others are associated with more uncertainty. EPA has previously worked with the Contractor to develop a stochastic spreadsheet model to quantify key areas of uncertainty related to indirect land use change GHG emissions. In previous work with EPA, the Contractor also submitted a Draft Research Plan to Quantify Uncertainty in Key Economic Models used in Lifecycle GHG Analysis. For this work assignment, the Contractor shall continue to operate and update the stochastic spreadsheet model used by EPA. Additionally, the Contractor shall continue the development of analytical techniques to quantify uncertainties in the key economic models used in biofuel lifecycle analysis.

II. CONTRACT LEVEL PERFOMANCE WORK STATEMENT REFERENCE

The tasks to be performed under this work assignment are consistent with the areas of analyses authorized in Tasks 7 and 9 of the contract's performance work statement.

III. PERFORMANCE WORK STATEMENT TASKS

Tasks and Deliverables:

The WA COR will review all deliverables in draft form and provide revisions and/or comments to the Contractor. The Contractor shall prepare the final deliverables incorporating the WA COR's comments.

Contractor personnel shall at all times identify themselves as Contractor employees and shall not present themselves as EPA employees. They shall not represent the views of the U.S. Government, EPA, or its employees. In addition, the Contractor shall not engage in inherently governmental activities, including but not limited to actual determination of EPA policy and preparation of documents on EPA letterhead.

Task 1 - Perform stochastic scenario analyses to quantify uncertainty in land use change GHG emissions

The Contractor shall run the Biofuels Stochastic international land use Lifecycle Analysis Model (BSLAM) to quantify uncertainty in biofuel-induced land use change GHG emissions. The Work Assignment Contracting Officer Representative (WA COR) will provide written technical direction to the Contractor for each scenario, including the necessary model inputs and scenario specifications. The Contractor shall implement minor adjustments and run the BSLAM given the requirements of each scenario as specified by the WA COR in the technical direction.

Based upon the written technical direction from the WA COR, the Contractor shall run the BSLAM and ensure that the model performs appropriately. As part of each scenario analysis, the Contractor shall perform quality assurance (QA) on the model results and provide a QA report to the WA COR documenting the QA procedures implemented and the findings from the QA process. The Contractor shall provide the scenario analysis results in electronic format through email to the work assignment COR. Results shall include the model outputs, such as total land use change GHG emissions with 95% confidence internals for each scenario, as well as disaggregated GHG emissions by region, time period, and land conversion type.

The Contractor shall prepare reports documenting the scenario analysis results for some but not all of the scenario analyses performed. Approximately 2-3 separate reports (approx. 5-10 pages each) will be required during the estimated period of performance. The WA COR will provide written technical direction to the Contractor with the requirements for each report. The reports delivered to the WA COR shall explain the analyses and results in plain English with technical details (e.g., complex equations) included in Appendices as appropriate.

Deliverables and schedule under Task 1

2a. Provide scenario analysis results to the WA COR within 5 business days after the WA COR submits technical direction

2b. Submit a QA report to the WA COR within 5 business days after the scenario analysis results are delivered to the WA COR

2c. Deliver a draft scenario analysis report to the WA COR within 15 business days after the WA COR submits technical direction

2d. Submit a final scenario analysis report to the WA COR within 5 business days after the WA COR submits comments on the draft report

Task 2 – Update the stochastic model

The Contractor shall update the BSLAM based on written technical direction from the WA COR. The WA COR shall provide updated datasets for the model to the Contractor as appropriate. New datasets to incorporate into the model will include updated forest carbon stocks and other updates to the data inputs that determine land conversion emissions factors. The Contractor shall input the data sets provided into the BSLAM and ensure that the model performs appropriately with the updated information. The Contractor shall also update the BSLAM documentation to reflect the updates completed. The Contractor shall provide the updated spreadsheet model and model documentation to the WA COR in electronic format.

The Contractor shall participate in monthly update calls with the WA COR to discuss the progress made in completing Task 2. The WA COR will provide written technical direction specifying the details of the monthly update calls. More frequent update calls may be necessary during certain stages of the period of performance, in which case the additional update calls will be specified in written technical direction from the WA COR.

Deliverables and schedule under Task 2

3a. Provide draft versions of the updated BSLAM model and documentation, including a QA report, to the WA COR by September 1, 2013.

3b. Provide a final version of the updated BSLAM model and documentation, including a QA report, to the WA COR by September 30, 2012.

3c. Monthly update calls with the WA COR to discuss progress being made in completing Task 2.

Task 3 – Design analytical techniques to address uncertainty in key economic models used in lifecycle GHG analysis

EPA has developed a Draft Research Plan to Quantify Uncertainty in Key Economic Models (Draft Research Plan) used in Lifecycle GHG Analysis.[1] The draft report provides a conceptual discussion/framework for evaluating such uncertainties. The Contractor shall implement the next steps outlined in the draft research plan based on written technical direction from the WA COR. The Contractor shall design analytical techniques to evaluate the behavior of different economic models to changes in key assumptions. This shall involve evaluating scenario analysis results from various economic models run by EPA. After reviewing modeling results and considering the underlying parameters in the relevant models, the contractor shall propose analytical techniques that can be used to address and evaluate the uncertainty in the models.

The Contractor shall participate in monthly update calls with the WA COR to discuss the progress made in completing Task 3. The WA COR will provide written technical direction specifying the details of the monthly update calls. More frequent update calls may be necessary during certain stages of the period of performance, in which case the additional update calls will be specified in technical direction from the WA COR. (The update calls for Task 2 and Task 3 will likely be scheduled at the same time based on written technical direction from the WA COR).

Deliverables and schedule under Task 3

4a. Provide a draft report proposing analytical techniques to address and evaluate uncertainty in electronic format by September 1, 2013.

4b. Provide a final report proposing analytical techniques to address and evaluate uncertainty in electronic format by September 30, 2013.

4c. Monthly update calls with the WA COR to discuss progress being made in completing Task 3.

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[1] ICF International. 2011. Draft Research Plan to Quantify Uncertainty in Key Economic Models used in Lifecycle GHG Analysis. Draft report submitted to the EPA. September 30, 2011.

Task 4 – Quick turn-around and technical support

The Contractor shall provide specialized expertise on uncertainty assessment, or perform model runs, on an as needed basis to: (i) consult with EPA on various aspects of uncertainty associated with lifecycle GHG analysis of biofuels, (ii) review, summarize and critique academic literature and other research related to uncertainty associated with lifecycle GHG analysis of biofuels, (iii) perform quick-turn modeling or quantitative analysis related to uncertainty assessment, (iv) prepare presentations and present analyses to EPA staff and stakeholders, and (v) revise existing analyses and reports. These quick response tasks may require the involvement of collaborative researchers who have expertise identified in the Statement of Work. Quick turn-around tasks are expected to take 1-2 weeks each, but some quick-turn around tasks may require deliverables from the Contractor in 24-48 hours. The details and schedule of deliverables for these quick turnaround and technical support requests will be included in written technical direction from the WA COR. The total expected level of effort on this task would be 25 hours.

Baseline Schedule of Deliverables under Task 4

5a. Deliver draft results of the quick turn-around technical support within 5 business days after the WA COR submits technical direction

5b. Deliver final results of quick turn-around technical support within 5 business data after the WA COR provides comments on the draft results

Travel:

This WA may include one trip by the Contractor in order to inform EPA and stakeholders of progress, or present study results generated under the WA at a professional conference or similar event. If necessary, the trip will be to a location in the eastern or central time zone in the United States. The Contractor will send one person on the trip, if necessary. As specified in written technical direction from the WA, the Contractor may be required to present a short presentation, such as a slide show, of approximately 30 minutes in duration.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-03

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013	Powertrain Testing and Validat
	Base Option Period Number 1	

Contractor: ICF INCORPORATED, L.L.C.

Specify Section and paragraph of Contract SOW: Task 2, 2f, 2g

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 10/01/2012 To 09/30/2013

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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Authorized Work Assignment Ceiling

Contract Period: 02/01/2012 To 09/30/2013 — Cost/Fee: — LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: — Cost/Fee: — LOE:

Cumulative Approved: — Cost/Fee: — LOE:

Work Assignment Manager Name: Houshun Zhang (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4214 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: Jose Ortiz (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2831 FAX Number: 513-487-2109
Contracting Official Name: Sandra Savage (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2046 FAX Number:

PERFORMANCE WORK STATEMENT

A.	EPA Contract:	EP-C-12-011
B.	Work Assignment (WA):	WA 1-03
C.	Issuing Office:	EPA Office of Transportation and Air Quality (OTAQ) 2000 Traverwood Dr. Ann Arbor, Michigan 48105
D.	Contractor:	ICF International 9300 Lee Highway Fairfax, VA 22031-1207
E.	Statement of Work:	Powertrain Testing and Validation, Part II
F.	Work Assignment Managers (WAM)	Houshun Zhang 734-214-4214 zhang.houshun@epa.gov
	Alternate WAM	Christine Brunner 734-214-4287 brunner.christine@epa.gov

I. BACKGROUND

The U.S. Environmental Protection Agency (EPA) and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) recently announced a first-ever program to reduce greenhouse gas (GHG) emissions and improve fuel efficiency of heavy-duty trucks and buses. This program is the first phase of the multi-stage GHG reduction approach. Hybrid system certification is part of the program. Due to technical challenges to quantify hybrid vehicle benefits as opposed to conventional vehicles, the agencies, working together with industrial stakeholders, are developing different concepts for certification. One of the concepts is powertrain test or powerpack test approach. The powertrain system includes engine, hybrid related components, and transmission. This approach must rely on a conventional baseline for use of comparison with the new hybrid system. The challenge is how to select, test, and validate this conventional powertrain baseline system without the hybrid system. To date very little work has been done in this area. Consequently, this work assignment will spearhead the efforts to select, test, and validate the baseline powertrain system before moving to the more complicated hybrid system. The contractor shall select a few representative vehicles, remove powertrain baselines from the selected vehicles, and perform engine, powertrain, and vehicle tests. Due to the time sensitivity and complexity of this project that will involve vehicle chassis dyno test, engine and powertrain dyno tests, and hardware-in-loop software development, it is highly

desirable that the contractor be able to handle all tasks in one physical location to deliver program objectives in a timely and cost effective manner.

This work assignment (WA) continues and expands upon the work started under WA 0-03 of contract EP-C-12-011.

II. SCOPE OF WORK

Task 1: Vehicle and trailer procurement

For the purposes of this work assignment, the contractor shall utilize any vehicles acquired or utilized under WA 0-03 and WA 0-03, Amendment 1, or shall complete the acquisition of such vehicles under this work assignment, WA 1-03.

In addition, the contractor shall provide one (1) city transient bus for testing under this work assignment. The bus shall be a class 6 or 7 category, 2010 or later model, and shall be equipped with an engine that meets the 0.20g/hphr of NOx. EPA recommends that a vehicle with Cummins ISB or ISX engines be used. The contractor shall ensure EPA WAM approval of any proposed vehicle/engine combination prior to acquiring the vehicle.

Vehicles utilized in this work assignment will not become government-furnished property, and the contractor shall ensure appropriate disposition of vehicles after all testing is completed.

Task 2: Coastdown test, per vehicle

For every vehicle acquired or utilized under WA 0-03 and WA 0-03, Amendment 1, or acquired under this work assignment, WA 1-03, the contractor shall conduct coastdown tests if such tests were not conducted as part of WA 0-03 or WA 0-03, Amendment 1. The contractor shall use the test procedure described in part 1066.310 of Title 40 to obtain estimates of road load and aerodynamic drag for input to dynamometer settings as well as inputs for modeling in terms of A and C coefficients. This test consists of 10 valid replicate coastdowns done in each alternating direction to minimize the effect of wind (a total of 20 runs per vehicle).

Task 3: Vehicle chassis dynamometer test for fuel economy and emissions

For every vehicle acquired or utilized under WA 0-03 and WA 0-03, Amendment 1, or acquired under this work assignment, WA 1-03, the contractor shall measure emissions and fuel economy based on standard EPA emissions testing and fuel economy methods outlined in the United States Code, Title 40, part 1066, if such tests were not conducted as part of WA 0-03 or WA 0-03, Amendment 1.

The contractor shall collect data using cell emission equipment.

Depending on the vehicle and application, different driving cycles shall be used to test the vehicles. Each vehicle shall be subjected to a minimum of five driving cycles. The EPA WAM

will provide written technical directions to specify the driving cycle(s) to be run on each vehicle. Five valid replicate runs are required for each driving cycle. A valid replicate is a successful test run in which all data are collected and there is no regeneration of the diesel particulate filter.

The following parameters shall be measured or recorded as appropriate:

- Vehicle speed as function of time
- Engine fueling as function of time
- Engine speed as function of time
- Gear number as function of time
- Engine load (N-M) as function of time
- Emissions (NOx, HC, CO, CO2, N_2O, CH_4) in g/s as function of time
- Measured cycle MPG and emissions (NOx, HC, CO, CO2, PM, N_2O, CH_4)
- Grade as function of time for the cycle with gradeability

Vehicle/engine pedal position as function of time shall be measured, if it can be accomplished.

While actual gear number is required, the contractor shall compare the recorded gear number with a calculated result based on deduction from other relevant testing data.

The results from this task, including fuel consumption and emissions, shall be used for validation of the powertrain tests in Task 4. The contractor shall obtain the engine and vehicle parameters as indicated in Table 1.

Table 1. Engine and Vehicle Parameters

1	Engine Model and Year
2	Engine rating and displacement
3	Transmission Model and Year
4	Transmission (Numbers of speed, auto or manual)
5	Gearbox Ratio
6	Gearbox Efficiency as function of gear number
7	Engine Inertia [kg-m^2]
8	Transmission Inertia [kg-m^2]
9	All Axle Inertia [kg-m^2]
10	Loaded Tire Radius [m]
11	Rolling Resistance for Each Tire (kg/Metric ton)
12	Total Weight [kg]

13	Frontal Area [m^2]
14	Aero Drag Coefficient
15	Axle Base (numbers of axles)
16	Electrical Accessory Power [W]
17	Mechanical Accessory Power [W]
18	Final Drive (Axle) Ratio

Some of the inertia data may require special testing, such as combination inertia of wheel, tire and axle if the data is not available from the supplier. The contractor shall consult with the EPA WAM prior to initiating such special testing. The contractor shall discuss with the EPA WAM any limitations to accomplishing the requirements of this task.

Task 4: Powertrain baseline tests

All testing and activity under this task shall be conducted only on the Ford flat bed truck provided under WA 0-03. This vehicle has a 2012 Cummins ISB engine with 300hp rating, and the transmission is Allison 2200 RDS 5-speed automatic model.

Task 4a. This subtask continues the work started under Task 4 of WA 0-03 of this contract. Any aspect of the activity described below that was not completed under WA 0-03 shall be completed under this WA 1-03.

The contractor shall pull the engine and transmission out of the vehicle and install it in a powertrain dyno cell for tests after completion of Task 3. Prior experience in handling this kind of powertrain test is essential. The powertrain test cell shall be available at the time when the powertrain test is set to start. The contractor shall setup the powertrain cell that includes both engine and transmission. All necessary sensors and instruments shall be installed for the required measurements indicated in the following paragraph. The contractor shall test the baseline operation first, making sure that the powertrain system can be operated properly. One set of powertrain system tests shall be conducted with six (6) specific driving cycles that are used to simulate vehicle driving cycles.

The following parameters shall be measured during tests as function of time:

- Torque at the transmission output shaft
- Engine torque
- Engine fueling rate
- Simulated vehicle fueling consumption in mile per gallon (MPG)
- Engine speed
- Transmission speed at the output shaft
- Simulated vehicle speed
- Accelerate and braking command in terms of percentage

- Emissions (CO2 , NOx, CO, HC)
- Cycle-weighted particulate matter (PM)

No diesel particulate filter (DPF) regeneration shall occur during any of these tests.

Performance and emission comparisons shall be made between the vehicle test and the powertrain test for each driving cycle conducted by each powertrain system. A detailed analysis and report shall be conducted to summarize the comparisons and findings between vehicle chassis dyno and powertrain dyno tests.

Task 4b. The driving-cycle tests shall include two levels of powertrain test cell baseline testing. The first level shall utilize engine and transmission data previously derived from chassis-dyno testing, thus proving out the powertrain test cell hardware capabilities to successfully "drive" six test cycles. The second level of powertrain tests shall be conducted using a simplified vehicle and driver model, thus eliminating the need to use chassis-dyno data to drive the six test cycles. The intent of this subtask is to prove-out the hardware-in-loop (HIL) setup, such that it will be ready for model improvements and more extensive testing in Task 5 of Work Assignment 1-03.

Task 4c. The contractor shall conduct analysis of setup differences between the chassis-dyno and powertrain test cells. The contractor shall generate data and comparisons of differences in operation of each test cell system, such that these differences might be minimized or accommodated in later testing and correlation efforts.

Task 5: Hardware-in-loop development

All testing and activity under this task shall be conducted on the Ford flat bed truck procured under WA 0-03. This vehicle has a 2012 Cummins ISB engine with 300hp rating, and the transmission is Allison 2200 RDS 5-speed automatic model.

Task 5a. This subtask continues the work started under Task 5 of WA 0-03 of this contract. Any aspect of the activity described below that was not completed under WA 0-03 shall be completed under this WA 1-03.

In conjunction with Task 4, the contractor shall develop a vehicle and driver model in order to simulate vehicle operation through a powertrain system test. The EPA WAM will first provide its own vehicle and driver model to the contractor as a baseline to start with. The contractor shall modify the vehicle and driver model provided by the EPA WAM in order to allow the model to communicate with the powertrain hardware. Finally, the contractor shall develop a protocol to communicate the powertrain system hardware with to-be-developed vehicle and driver models. Figure 1 provides the technical communication sketch between hardware and software:

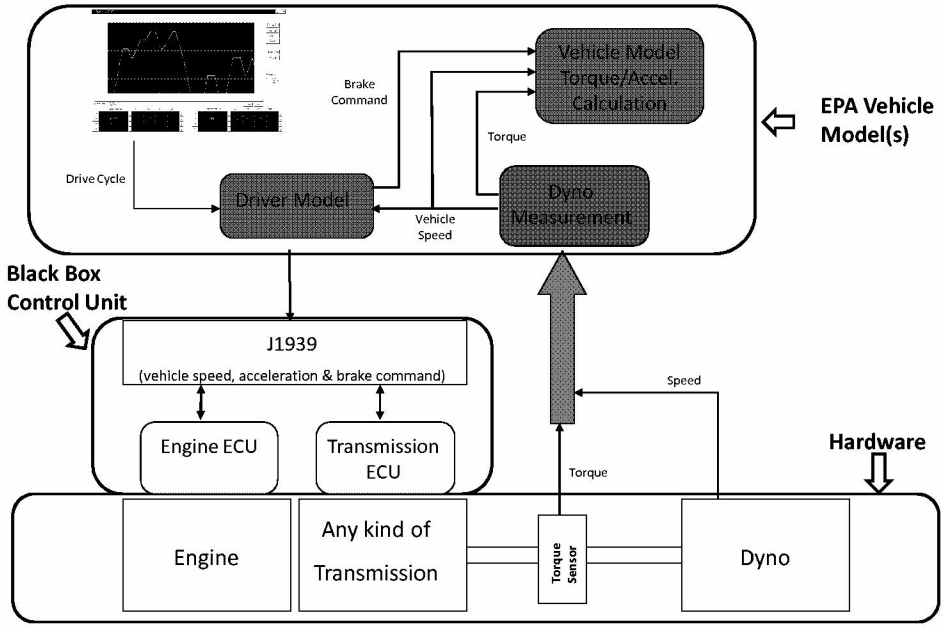

Figure 1. Powertrain system communication sketch

As shown in Figure 1, the entire system consists of three major components – hardware, black box control unit, and vehicle model. It is expected that the vehicle and driver model shown in Figure 1 shall have adequate fidelity capable of modeling vehicle performance accurately with highly transient driving cycles. Final validation of this task in a powertrain cell depends on the completion of Task 4.

Task 5b. The contractor shall conduct analysis of test-to-test data variation (coefficients of variance or other) and comparison of these results between chassis-based testing and powertrain-based testing. Upon receipt of written technical direction from the EPA WAM, this subtask may require increasing the total number of repeated tests for improved statistics on variance calculations.

Task 5c. The contractor shall conduct in-depth review and analysis of coast-down aerodynamic and rolling resistance test methods, with the goal of extracting a reliable frontal-area and effective frontal-area implementation within the HIL vehicle model. The analysis shall include attention to test-to-test variance in coast-down data and its effect on predicted fuel economy for chassis dyno and powertrain-based test systems.

Task 5d. The contractor shall analyze and review data to provide insight as to improvement methods for the HIL vehicle model. Examples might include development of proposed methods to model vehicle cooling system dynamics, such as air-to-air intercooler and engine radiator, thus allowing near-real-time control parameters for the powertrain test cell liquid-to-liquid and liquid-to-air engine heat exchanger system. The goal of this subtask is to identify test-system differences and offer potential solutions to minimize correlation differences between chassis-based tests and powertrain-based tests.

Task 6: Additional Vehicle Tests

Task 6a. The EPA WAM and the contractor will select one highway route to run the Class 8 truck. This route shall include certain uphill and downhill with noticeable grade variation. The intent of this test is to find a good correlation in gradeability between the over-the-road condition test and the simulated chassis dynamometer test. The collected data will be used to validate the Agency simulation model. All parameters listed in Table 1 of Task 3 shall be measured during this on-road test.

Task 6b. The EPA WAM and the contractor will select one city route to run the transient city bus. This route may include certain uphill and downhill with noticeable grade variation. All parameters listed in Table 1 of Task 3 shall be measured during this on-road test.

Because a city transient bus uses a significant portion of its auxiliary power for air conditioning or heating, the contractor shall measure and report the power loss during on-chassis and on-road testing.

Task 7: Constant Speed Test Evaluation

The contractor shall conduct a constant speed test to determine truck aerodynamic drag coefficient and rolling resistance. The contractor shall use the class 8 truck for this task. There is no formal SAE or industry standard on this test, however, the technical report issued by the International Council on Clean Transportation (ICCT), entitled "Evaluation of fuel efficiency improvements in the Heavy-Duty Vehicle (HDV) sector from improved trailer and tire designs by application of a new test procedure" (Report No. I-24/2011 Hb-Em 18/11/679 from 15.12.2011) shall be used as a reference. The torque measuring in the rims or with a flange between rim and wheel end is recommended for this test.

Task 8: Potential Sources of Variability in EPA Coast-down Test Process

The contractor shall evaluate the variability of the EPA coastdown test process under the two most extreme conditions (calm, winding), according to the procedure described in part 1066.310 of Title 40. The contractor shall use the class 8 truck for this task. The contractor shall conduct a statistical analysis and report on the variation of rolling resistance and aerodynamic drag under these two extreme conditions. Similar to the test procedure described in part 1066.310 of Title 40 to obtain estimates of road load and aerodynamic drag for input to dynamometer settings as well as inputs for modeling in terms of A and C coefficients, the contractor shall recommend a number of reasonable replicate coastdowns done in each alternating direction of each extreme condition.

IV. DELIVERABLES

1. Quality Assurance Project Plan (QAPP).

The contractor shall submit a draft QAPP to the EPA WAM within 30 days of Work Plan submission. The QAPP shall detail data collection and analysis tasks and procedures for this work assignment. The QAPP approved under WA 0-03 may be used as a starting point and modified to include additional activity contained in this WA 1-03. The EPA WAM shall review and comment on the draft QAPP. The contractor shall incorporate recommended changes and suggestions received from the EPA WAM and shall submit a final QAPP within 15 days after receipt of EPA comments. Information on completing a QAPP can be found at http://www.epa.gov/quality/at/extramural.html (general requirements) and /qatools.html (QMP/QAPP).

The final QAPP shall cover all aspects of this test program as outlined on the EPA quality website. The QAPP shall have an appendix containing all applicable standard operating procedures (SOPs). The contractor shall adhere to all applicable SOPs and the QA procedures recommended therein. The contractor shall notify the EPA WAM immediately if they encounter any equipment failures that cannot be remedied, problems that may impact the quality or on-time receipt of deliverables, or unavailability of items required for this work assignment.

2. Bi-Weekly Progress Reports.

The contractor shall provide the EPA WAM with bi-weekly status reports via telephone conference or email during the period of performance. The progress report shall indicate the progress achieved in the concluded weeks, technical problems encountered, solutions to those problems, and projected activity for the upcoming weeks. Before proceeding with any solution to a problem, the contractor shall report the problem and consult with the EPA WAM concerning the scope of the solution. The bi-weekly progress report shall include an estimate of the percentage of each task completed to date, and the resources (level of effort and cost) expended on each task.

3. Technical Reports.

The contractor shall provide the EPA WAM with a brief Technical Report upon completion of each task. Depending on the complexity of the subject matter and as directed via written technical direction by the EPA WAM, these reports shall be in the form of either a presentation or a formal written document. Written products shall be delivered in formats specified by the EPA WAM (e.g., Word, Excel).

4. Data.

The contractor shall provide the EPA WAM with raw test data within 2 business days of receiving request for such data via written technical direction from the EPA WAM. The contractor shall provide to the EPA WAM valid test data from a vehicle (per task) within 14 days of completion of the testing on the vehicle. All data shall be presented in Excel format.

5. Draft and Final Reports.

The contractor shall provide to the EPA WAM a Draft Final Report and data set summarizing the results of all tasks within 30 days of completion of the laboratory and modeling work contained in this work assignment. The contractor shall deliver the Final Report within 15 days of receipt of comments from the EPA WAM.

Schedule of Deliverables

Steps	**Completion Date**
QAPP submission	Within 30 days of Work Plan submission
Final QAPP	Within 15 days of receiving EPA comments
Complete all tasks	Before January 30, 2013
Test Data	Raw data - within 2 business days of EPA WAM request Vehicle test data - within 14 days of completion of the testing on a vehicle
Draft Final Report	Within 30 days of completion of all tasks
Final Report	Within 15 days of receipt of EPA comments on Draft Final Report

NON-DISCLOSURE AGREEMENT
All documentation acquired and/or provided by EPA or generated as a result of this project shall be under the control of the U.S. EPA Assistant Administrator for Air and Radiation, or his or her designated representative, and shall not be released by the contractor to any other source without specific approval by U.S. EPA.

Appendix A

Gasoline Light-Duty Exhaust Emissions Study

Test Fuel Specification

PROPERTY	UNIT	METHOD	BLENDING TOLERANCE	Test Fuel						INSTRUCTIONS
				EPAct 7	EPAct 13 Mod	100	EPAct 26	101	102	
				EPAct fuel	EPAct fuel #13 modified to achieve T50=193 °F and more uniform C7, C8, C9 and C10+ aromatic distribution	New fuel	EPAct fuel	Fuel 100 plus 15% of C10+ aromatics, w/ethanol and DVPE adjusted to fuel 100 levels	Fuel 100 plus 15% of toluene, w/ethanol and DVPE adjusted to fuel 100 levels	
Density, 60°F	g/cm^3	D4052	NA	Report	Report	Report	Report	Report	Report	
API Gravity, 60°F	°API	D4052	NA	Report	Report	Report	Report	Report	Report	
Ethanol	vol. %	D5599	E0: < 0.1; E15: ± 0.5	0	0	15	15	15	15	D5599 reports in mass %. Convert to vol. % per Section 14.3 of D4815
Total Content of Oxygenates Other Than Ethanol			-	<0.1	<0.1	<0.15	<0.15	<0.15	<0.15	
O	mass %		-	Report	Report	Report	Report	Report	Report	
T10	ºF	D86 (OptiDist or equivalent)	-	<158	<158	<158	<158	Report	Report	Make sure that the distillations are done with the still set to measure charge volume in the receiving cylinder
T50			± 4	193	193	160	160	Report	Report	
T90			± 5	300	340	300	340	Report	Report	
FBP			-	<437	<437	<437	<437	Report	Report	
DVPE (EPA equation)	psi	D5191	± 0.15	7.2	7.2	10.2	10.2	10.2	10.2	
Aromatics	vol. %	D1319	-	Report	Report	Report	Report	Report	Report	Correct results for ethanol content
Saturates			-	Report	Report	Report	Report	Report	Report	
Olefins			-	Report	Report	Report	Report	Report	Report	
Benzene	vol. %	D3606	± 0.15	0.62	0.62	0.62	0.62	Report	Report	
Detailed Composition	vol. %	D6729	-	Report	Report	Report	Report	Report	Report	Report results in Honda format, also in mass % and mol %
Benzene			-	Report	Report	Report	Report	Report	Report	
Toluene			± 1	5.5	11.5	5.5	10	Report	20.5	
C8 Aromatics			± 1	5.5	11.5	5.5	10	Report	Report	
C9 aromatics			± 1	5.5	11.5	5.5	10	Report	Report	
C10+ Aromatics			± 1	2.5	5.5	2.5	8	17.5	Report	
Total Aromatics			± 2	19	40	19	38	Report	Report	
Cycloparaffins			-	Report	Report	Report	Report	Report	Report	
Olefins			-	Report	Report	Report	Report	Report	Report	
Ethanol			-	Report	Report	Report	Report	Report	Report	
S	mg/kg	D5453	± 5	25	25	25	25	25	25	
RON	-	D2699	-	Report	Report	Report	Report	Report	Report	
MON	-	D2700	-	Report	Report	Report	Report	Report	Report	
(R + M)/2	-	Calc.	-	≥89	≥91	≥91	≥91	≥91	≥91	
C (Part of D4809)	mass %	D5291	-	Report	Report	Report	Report	Report	Report	D5291 as written is not applicable to gasoline. Perform this test at a laboratory which has adapted it to gasoline
H (Part of D4809)			-	Report	Report	Report	Report	Report	Report	
Water	mg/kg	E1064	-	Report	Report	Report	Report	Report	Report	
Lead	g/l	D3237	-	Report	Report	Report	Report	-	-	
Net Heat of Combustion	mass %	D4809	-	Report	Report	Report	Report	Report	Report	
Oxidation Stability	minute	D525	-	>240	>240	>240	>240	>240	>240	
Copper Strip Corrosion, 3h at 122°F	-	D130	-	<No. 1	<No. 1	<No. 1	<No. 1	<No. 1	<No. 1	
Solvent-Washed Gum Content	mg/100 ml	D381	-	< 5	< 5	< 5	< 5	< 5	< 5	

May 31, 2012

Appendix B

Gasoline Sampling Procedure

1. Cool the fuel inside the drum, sampling equipment and sample containers to a temperature not exceeding 50°F

    - Use a hand transfer pump

    - The glass sample container must meet the following requirements:

        i. 1 qt. capacity
        ii. Its cap must be equipped with a neoprene seal

2. Position the sampling tube to take the fuel sample from the mid-height of the fuel level in the drum

3. Using the hand transfer pump, activate the flow of fuel from the drum into a slop container and slop at least 1 qt. of fuel

4. Fill the sample container to 75-80% of capacity and seal tightly to prevent sample losses

    - Make sure that during sampling the fuel flows gently (w/o splashing) into the sampling container. Use a filling tube that reaches to the bottom of the container

5. Store the sample at a temperature not exceeding 50°F prior to opening the sample container

6. Have the sample analyzed as quickly as possible

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-04

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013 Base Option Period Number 1	Fuels for Gasoline Light-Duty

Contractor	Specify Section and paragraph of Contract SOW
ICF INCORPORATED, L.L.C.	Task 1, 1d Fuel Blending

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 10/01/2012 To 12/31/2012

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
02/01/2012 To 09/30/2013		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Rafal Sobotowski (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4228 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Matthew Growney (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2029 FAX Number: 513-487-2109

Performance Work Statement

Contract EP-C-12-011	Work Assignment Number 1-04
Issuing Office	Environmental Protection Agency 2000 Traverwood Drive Ann Arbor, MI 48105-2498
Contractor	ICF International 9300 Lee Highway Fairfax, VA 22031
Title	Fuels for Gasoline Light-Duty Exhaust Emissions Study, Continuation

EPA Personnel

Work Assignment Manager (WAM)	Rafal Sobotowski 734/214-4228 sobotowski.rafal@epa.gov
Alternate WAM	Christine Brunner 734/ 214-4287 brunner.christine@epa.gov

BACKGROUND

The Environmental Protection Agency (EPA) would like to conduct an experimental study aimed at filling significant data gaps in our understanding of how the properties of gasoline fuels affect exhaust emissions from the newest technology (Tier 2) SI-powered vehicles. Fuel properties of interest include T50, T90, ethanol content, and aromatic hydrocarbon content. The nature of this study requires custom design and blending of the test fuels as well as control of numerous other fuel properties such as vapor pressure, benzene content, sulfur content or octane number.

The EPA desires to develop the recipes of four test fuels in coordination with the Contractor and reuse two formulations developed recently for another program. This will require the contractor to provide the properties of the blending components to the EPA for use in test fuel design.

TASKS

This work assignment continues the work started under WA 0-04 of contract EP-C-12-011; the task numbering reflects this continuation. Note that test method D5769 has been added to Task 7. The Quality Assurance Project Plan (QAPP) prepared for WA 0-04 will continue to apply to this work assignment.

Task 7 Preparation and Analysis of Bulk Blends

Upon approval of the hand blend inspection data, the EPA WAM will generate the final specification for the bulk blend of each test fuel based on the template found at the end of this document in Table 1 entitled Final Specifications.

The contractor shall prepare 300 gallon bulk blends of test fuels EPAct 7, EPAct 13 Mod, 100 and EPAct 26 and 101, and adjust their properties until the blends meet the specifications defined in the Final Specifications Table. The following situations and Notes shall be considered:

- Density, ethanol, distillation, DVPE, benzene, detailed composition, aromatic species, sulfur and anti-knock index ((R+M)/2) shall be first measured by the contractor.

Note: The sulfur content of these fuels shall be adjusted using a three-component sulfur mixture containing 4.3 mass% dimethyl disulfide, 22.8 mass% thiophene, and 72.9 mass% benzothiophene.

- The fuel shall be also analyzed by an independent laboratory in two phases:

Phase 1: Initially, ethanol, distillation, DVPE, benzene, sulfur and anti-knock index ((R+M)/2) shall be determined.

Phase 2: The remaining fuel properties shall be determined only when the average values of ethanol, distillation parameters, DVPE, benzene, sulfur and anti-knock index ((R+M)/2) determined by the contractor and the independent laboratory have been shown to meet the requirements of the specifications defined in the Final Specifications Table above. They must also be within the reproducibility limits of each test method.

Note: Convert D5599 ethanol results to vol % per Section 14.3 of D4815.

Note: Use only OptiDist distillation stills to generate D86 distillation data. Set them to measure charge volume in the receiving cylinder.

Note: Calculate D5191 DVPE using the EPA equation per 40 CFR, Part 80.46. Report total pressure measured during the test along with DVPE.

Note: D6729 detailed composition data must be reported in Honda format. The EPA WAM will use D6729 data provided by the contractor to calculate C7, C8, C9 and C10+ aromatic composition of the fuels.

Note: D5291 as written is not applicable to gasoline. Measure C and H by D5291 only at a laboratory which has adapted the test method to gasoline.

Once the analytical results generated by the Contractor and the independent laboratory indicate that the bulk blend meets the specification defined in the Final Specifications Table, the contractor shall present these results to the EPA WAM for approval. Upon approval by the EPA WAM, an oxidation inhibitor shall be added to the fuel and the whole bulk blend shall be transferred into 5B drums. The Contractor shall ensure the use of fuel storage and handling practices that will minimize, to the greatest extent possible, any changes in the properties of finished fuels or mislabeling of fuel drums. Upon written technical direction from the EPA WAM, the Contractor shall also prepare 300 gallons of fuel 102 in the same manner as described above for the other fuels (the cost estimate shall indicate the cost of this volume separately).

In addition, upon written technical direction from the EPA WAM, the Contractor shall prepare an additional 50 gallons of any fuel prepared under this WA 0-04. Such technical direction will be provided prior to the preparation of the bulk blend. The cost estimate shall indicate the cost of such a 50 gallon increment.

A 1-quart sample of each fuel shall be shipped by the Contractor to the EPA as provided in written technical direction by the EPA WAM. The Gasoline Sampling Procedure provided in Appendix B shall be used to take fuel samples from drums.

Task 8 Fuel Storage

Upon written technical direction from the EPA WAM, the Contractor shall provide for the storage of the bulk blends. Storage shall be in the Detroit, MI, area for a period of up to 5 months, indoors, at temperatures not exceeding 75°F. The storage parameters are required to ensure minimal changes in fuel quality. Because the fuel drums shall be gradually removed from the storage facility by the EPA as the emissions test program progresses, a monthly decline in the number of drums stored can be expected, and shall be a factor in the cost determination.

DELIVERABLES

Weekly and Reports

The Contractor shall provide 15-20 minute telephone conference reports weekly to review progress to date. These oral reports shall indicate progress achieved in the preceding week, technical issues encountered, solutions to issues (proposed or attempted), and projected activity in the following week. They shall include any potential issues or circumstances that may be causing delays in the execution of this project. The EPA WAM or his/her designated alternate shall participate in these phone conferences.

Biweekly Reports

The Contractor shall provide the EPA WAM with a brief, biweekly written report summarizing hours and dollars expended on the Tasks in this work assignment.

Monthly Written Progress Reports

The Contractor shall provide monthly progress reports. The reports shall track percentages of hours used in each task and whether the project is on schedule. The Contractor shall explain problems encountered including resolutions and indicate if the schedule or budget was compromised.

The reports shall summarize the progress made during the reporting month, technical issues encountered, solutions to issues (proposed or attempted), and projected activity in the following month.

Data Files

Throughout the duration of this project, the Contractor shall submit fuel inspection data in Microsoft Excel format for review by the EPA WAM as soon as practicable.

Draft Final Report

The Contractor shall develop a draft final report that details the work completed and results from Task 3. This report shall include:

1) Detailed fuel specifications
2) Changes in specifications submitted by the EPA WAM
3) Description of issues encountered
4) Final fuel inspection data
5) Quantities procured

The draft final report shall be delivered to the EPA WAM within ten working days of approval of the last fuel for storage or shipment.

Final Report

The Contractor shall provide the final report, incorporating EPA comments, within 10 working days of receiving comments from EPA WAM. The report shall be submitted in both Microsoft Word and Adobe portable document files (*.pdf) formats.

Schedule of Deliverables

Steps	Completion Date
Fuel data delivered to EPA WAM	On-going
Data on final bulk fuel blends submitted to EPA WAM for approval	October 31, 2012
Draft Final report	November 16, 2012
Final report submission	10 working days from receipt of EPA WAM comments

Table 1. Final Specifications

PROPERTY	UNIT	METHOD	BLENDING TOLERANCE	SPECIFICATION
Density, 60°F	-	D4052	NA	Report
API Gravity, 60°F	°API	D4052	NA	Report
Ethanol	vol. %	D5599	E0: < 0.1; E15: ± 0.5;	Per Appendix A
Total Content of Oxygenates Other than Ethanol	vol. %	D5599	-	<0.1
O	mass %	D5599	-	Report
T10	°F	D86	± 5	Value approved by EPA WAM in Task 6
T30	°F	D86	± 5	Value approved by EPA WAM in Task 6
T50	°F	D86	± 4	Value approved by EPA WAM in Task 6
T70	°F	D86	± 5	Value approved by EPA WAM in Task 6
T90	°F	D86	± 5	Value approved by EPA WAM in Task 6
FBP	°F	D86	-	<437
DVPE (EPA equation)	psi	D5191	± 0.15	Value approved by EPA WAM in Task 6
Benzene	vol. %	D3606	± 0.15	Value approved by EPA WAM in Task 6
Toluene	vol. %	D6729	± 1	Value approved by EPA WAM in Task 6
C8 Aromatics	vol. %	D6729	± 1	Value approved by EPA WAM in Task 6
C9 Aromatics	vol. %	D6729	± 1	Value approved by EPA WAM in Task 6
C10+ Aromatics	vol. %	D6729	± 1	Value approved by EPA WAM in

				Task 6
Aromatic Species	vol. %	D5769	-	Report
S	mg/kg	D5453	± 5	25
(R + M)/2	-	Calc.	-	Per Appendix A
C (Part of D4809)	mass %	D5291	-	Report
H (Part of D4809)	mass %	D5291	-	Report
Water Content	mg/kg	E1064	-	Report
Net Heat of Combustion	MJ/kg	D4809	-	Report
Oxidation Stability	minute	D525	-	>240
Copper Strip Corrosion, 3h at 122°F	-	D130	-	<No. 1
Solvent-Washed Gum Content	mg/100 ml	D381	-	< 5

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-04

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2016 Base Option Period Number 1	Fuels for Gasoline Light Duty

Contractor	Specify Section and paragraph of Contract SOW
ICF INCORPORATED, L.L.C.	Task 1, 1d

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 10/01/2012 To 12/31/2012

Comments:
This work assignment Amendment 1 removes the draft and final reports as Deliverables.

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
02/01/2012 To 09/30/2016		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Rafal Sobotowski (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4228 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Sandra Savage (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2046 FAX Number:

Performance Work Statement

Contract EP-C-12-011	Work Assignment Number 1-04, Amendment 1
Issuing Office	Environmental Protection Agency 2000 Traverwood Drive Ann Arbor, MI 48105-2498
Contractor	ICF International 9300 Lee Highway Fairfax, VA 22031
Title	Fuels for Gasoline Light-Duty Exhaust Emissions Study, Continuation

EPA Personnel

Work Assignment Manager (WAM)	Rafal Sobotowski 734/214-4228 sobotowski.rafal@epa.gov
Alternate WAM	Christine Brunner 734/ 214-4287 brunner.christine@epa.gov

ACTION:

This amendment removes both the draft final report and final report from the Deliverables.

As a result of implementation of the work assignment, the EPA WAM has all of the information that was to be contained in those reports, including

1) Detailed fuel specifications;
2) Changes in specifications submitted by the EPA WAM;
3) Description of issues encountered;
4) Final fuel inspection data; and
5) Quantities procured.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-05

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013	GHG Transportation Inventory D
	Base Option Period Number 1	

Contractor: ICF INCORPORATED, L.L.C.

Specify Section and paragraph of Contract SOW: Task 7a

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 11/20/2012 To 07/01/2013

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 02/01/2012 To 09/30/2013 — Cost/Fee: — LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: — Cost/Fee: — LOE:

Cumulative Approved: — Cost/Fee: — LOE:

Work Assignment Manager Name: Venu Ghanta (Signature) (Date)	Branch/Mail Code: Phone Number: 202-564-1374 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: Venu Ghanta (Signature) (Date)	Branch/Mail Code: Phone Number: 202-564-1374 FAX Number:
Contracting Official Name: Angela Lower (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2036 FAX Number:

PERFORMANCE STATEMENT OF WORK

STATEMENT OF WORK	EPA Contract EP-C-12-011
WORK ASSIGNMENT	1-05
A. Issuing Office:	Environmental Protection Agency 2000 Traverwood Dr. Ann Arbor, Michigan 48105
B. Contractor:	ICF International 9300 Lee Highway Fairfax, VA 22031-1207
C. Statement of Work:	GHG Transportation Inventory Development
D. Work Assignment Manager (WAM)	Venu Ghanta (202) 564-1374 ghanta.venu@epa.gov
Alternate WAM	Rachael Nealer (202) 564-7478 nealer.rachael.epa.gov

BACKGROUND

The transportation sector is responsible for roughly 30 percent of greenhouse gas (GHG) emissions in the U.S., as well as the production of smog precursors, carbon monoxide (CO) and air toxics. Other impacts from transportation include noise and ecosystem disturbance. These effects are acknowledged through national legislation and other commitments, including:

- National Environmental Protection Act of 1969 (NEPA)
- Clean Air Act (CAA) Amendments of 1990
- Intermodal Surface Transportation Act of 1991 (ISTEA)
- Transportation Equity Act for the 21st Century (TEA-21)
- Climate Change Action Plan of 1993 (CCAP) and
- 1993 United Nations Framework Convention on Climate Change (UNFCCC).

EPA supports a range of analytic functions to demonstrate the environmental impacts of transportation. The U.S., with lead responsibility by EPA, is required the UNFCCC to report to the United Nations all U.S. emissions and sinks of GHGs. By mutual agreement with the Office of Atmospheric Programs (OAP), the Office of Transportation and Air Quality (OTAQ) has assumed responsibility for preparing estimates of GHG emissions for the transportation sector.

Within OTAQ, the Transportation and Climate Division (TCD) manages this analysis. TCD also supports EPA programs by examining the intersection of transportation policy, travel demand, vehicle engine technologies and energy consumption. Finally, TCD assists OTAQ and EPA in providing data and analysis to address the information requests of Congress, the Executive Branch, and the public.

WORK OVERVIEW

TCD's analytic work addresses the environmental impacts of transportation programs, policies and investments at all levels of government. This effort enhances the technical capacity of stakeholders in the fields of climate change analysis, air quality management, and transportation and urban planning.

TCD's analysis of transportation and climate change includes the development of an emissions inventory that identifies and quantifies the primary anthropogenic sources and sinks of U.S. GHG emissions (and corresponding baselines) from transportation sources. The GHG transportation inventory must contain: (1) a comprehensive and detailed methodology for estimating sources and sinks of anthropogenic GHG emissions at levels sufficiently detailed to support policy decisions; and (2) represent a common and consistent source of information enabling OTAQ to compare the relative contribution of different GHG emission sources to climate change. The ability to estimate emissions systematically and consistently is a prerequisite for evaluating the cost-effectiveness and feasibility of GHG mitigation strategies.

TCD also sponsors research examining transportation-related impacts on natural and human systems, with the objective of improving environmental analysis and informing policy development. This work includes the estimation of emission factors to quantify mobile-source GHG and criteria output, as well as policy-sensitive models to forecast travel demand and energy consumption. Model results may be used to evaluate climate-related policy scenarios and guide EPA programs (such as SmartWay). Associated data and analysis may also be used to assist decision-making outside the agency, including the development of federal legislation, and the environmental initiatives of state and local governments. This information is available to broaden the scope of environmental planning and assist with planning requirements.

Task 1: GHG Inventory Development for the Transportation Sector Required under UNFCCC

The contractor shall prepare the annual GHG emission inventory from the transportation sector for the Inventory of U.S. Greenhouse Gas Emissions and Sinks document. The inventory shall include estimates of carbon dioxide (CO_2), methane (CH_4), Nitrogen Dioxide (N_2O) and hydrofluorocarbons (HFC) emissions from all mobile sources, including highway vehicles, aircraft, rail, watercraft, and non-road mobile sources. The inventory shall also include emissions of the following criteria pollutants: CO, NO_x, VOCs, and sulfur dioxide (SO_2); estimates of these gases are to be obtained from the Office of Air Quality Planning and Standards

(OAQPS).

This task also includes performance of Quality Assurance and Quality Control (QA/QC) and uncertainty analyses. The contractor shall build upon the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009* document, improving on the estimation, documentation and reporting on uncertainties associated with both annual emission estimates and emission trends for the transportation inventory.

The contractor shall report transportation GHG/sink data in accordance with: (a) the required schedule for the annual inventory report (Report) required under UNFCCC and (b) the same formats necessary to complete tasks for the Report as defined through written technical direction by the Work Assignment Manager (WAM). Each submission of transportation-related data to Office of Atmospheric Programs (OAP) shall be first approved by the WAM. OAP and the WAM will provide the contractor with the guidance regarding uncertainty analysis, QA/QC activities, and requirements for documentation, spreadsheet management, annexes, work breakdown structure (WBS) and report write-up.

The Contractor may also be requested to provide additional analysis, research, and / or reports that support continued improvement of the transportation greenhouse gas inventory. As specific needs may evolve within the period of the contract, the WAM will provide written technical directive for each report, prior to the contractor commencing with this work.

Task 2: <u>Preparation of 2013 "Fast Facts" Document</u>

In conjunction with preparation of the final report in Task 1, the contractor shall prepare a summary report to be released publicly which summarizes emissions from the sources in the transportation sector. This summary report shall be prepared in a similar fashion to the "2011 GHG Fast Facts" document that was produced along with the *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009*. The summary report shall convey the highlights from the current year's inventory in sufficient detail to be used by policymakers within the Office of Transportation and Air Quality, while also be understood by the general public.

QUALITY ASSURANCE (QA) REQUIREMENTS

The contractor shall submit a written Quality Assurance Project Plan (QAPP) that describes the quality assurance procedures, quality control specifications, and other technical activities that must be implemented. Information on the requirements for a QAPP can be found at: http://www.epa.gov/quality/qs-docs/r5-final.pdf. Guidance for QAPPs for tasks that use existing data can be found at http://epa.gov/quality/qs-docs/found-data-qapp-rqts.pdf and http://www.epa.gov/spc/pdfs/assess2.pdf.

DOCUMENTATION

The Contractor shall fully substantiate and document all of its work. No work shall be duplicated from previous efforts, studies, reports, or other sources under this contract. In order to avoid duplication of effort, the Contractor shall always investigate existing literature and consult with the EPAWAM about any information the agency may have knowledge about prior to undertaking any market research activities. Reports submitted by the Contractor that contain recommendations to EPA shall explain and rank policy or action alternatives, describe the procedure used to arrive at recommendations, summarize the substance of deliberations, report any dissenting views, list the sources used, and make clear the methods and considerations upon which the recommendations are based.

SCHEDULE OF DELIVERABLES

1. Within one week of work plan approval, the Contractor shall meet with the EPA WAM to discuss the tasks within the SOW.
2. The contractor shall deliver the QAPP within two weeks of meeting identified in Deliverable #1. .
3. In addition to the Monthly Progress Reports, the Contractor shall contact the EPA WAM at least once a week to ensure that adequate progress is being made.
4. The Contractor shall provide the EPA WAM with all the spreadsheets required for the Transportation component of the 2013 U.S. Inventory of GHG Emissions and Sinks by mid-January 2013.
5. The Contractor shall have completed input to the Transportation component of the 2013 U.S. Inventory of GHG Emissions and Sinks by early April 2013.
6. The Contractor shall meet with the EPA WAM after release of the 2013 U.S. Inventory of GHG Emissions and Sinks to discuss initiating improvements for the 2014 version of this Report.
7. The Contractor shall review and provide input into the 2013 "Fast Facts" document.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-06

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013 Base Option Period Number 1	Engine Remanufacture/Glider Ki

Contractor	Specify Section and paragraph of Contract SOW
ICF INCORPORATED, L.L.C.	Task 2, Task 3

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 02/20/2013 To 09/30/2013

Comments:
Industry Characterization for Diesel Remanufacturing and Highway Truck Glider Kits

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 02/01/2012 To 09/30/2013		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Alan Stout (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4805 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: Jose Ortiz (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2831 FAX Number: 513-487-2109
Contracting Official Name: Sandra Savage (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2046 FAX Number:

PERFORMANCE WORK STATEMENT

A. EPA Contract: EP-C-12-011

B. Work Assignment: WA 1-06

C. Issuing Office: EPA Office of Transportation and Air Quality (OTAQ)
2000 Traverwood Dr.
Ann Arbor, Michigan 48105

D. Contractor: ICF International
9300 Lee Highway
Fairfax, VA 22031-1207

E. Statement of Work: Industry Characterization for Diesel Engine Remanufacturing and Highway Truck Glider Kits

F. Work Assignment Manager (WAM): Alan Stout
(734) 214-4805
stout.alan @epa.gov

G. Alternate WAM: Christine Brunner
(734) 214-4287
brunner.christine@epa.gov

Background

In 2009, ICF International prepared for EPA's Office of Transportation and Air Quality (OTAQ) a report, which is attached, on heavy-duty diesel engine (HDDE) rebuilding processes.[1] The report, Industry Characterization of Heavy-Duty Engine Rebuilds, Draft Final Report, September 2009 ("2009 Report"), provided a comprehensive industry characterization of the HDDE rebuild industry and describes how it operates within the U.S. market. A secondary focus of the report was the availability, cost, and installation requirements of particulate matter (PM) filter retrofits. This work assignment is intended to update that report and shift its focus.

Purpose

The purpose of this work assignment is to provide a comprehensive, detailed industry characterization of the HDDE rebuilding industry and describe how rebuilt engines are used. The main focus of the characterization is to summarize and analyze the growth of factory remanufacturing of HDDEs and similar nonroad diesel engines. A secondary focus is to

[1] For purposes of this work, the term "rebuilding" shall be interpreted to mean the full range of engine overhauls from in-frame overhauls by owner/operators to factory remanufacturing.

summarize and analyze the use of remanufactured engines in glider kits (i.e., new heavy-duty vehicles produced without new engines).

The information provided by the contractor will be used to aid EPA in understanding the extent to which engine rebuilding delays achieving the full benefits of new emission standards such as the newly adopted heavy-duty engine greenhouse gas standards, and in understanding and defining the impact, if any, that future regulations could have on the engine rebuild industry.

Tasks

The work required is divided into the three tasks below. The effort may necessitate the contractor contacting relevant companies. The contractor shall obtain approval from the EPA WAM prior to contacting any companies. The contractor shall not contact more than nine companies regarding this project.

In addition to the main effort, each task requires separate analysis of small entities. For purposes of this work assignment, a small entity is any company with total annual revenues of $7 million or less (including revenues from other business activities). Revenue figures should generally be considered together for a parent company and all its subsidiaries; however, if there is a business unit that operates with relative independence, the contractor shall include enough information to allow us to evaluate the impact of any EPA programs on both the smaller business unit and the company as a whole.

At the completion of each task, the contractor shall prepare a report for EPA WAM review. The contractor shall use the attached 2009 Report as a guide for the minimum level of detail required regarding the information for all tasks and reports under this work assignment (see further instruction under Deliverables).

Task 1. Update "2009 Report"

The contractor shall prepare a report that is an update of Chapter 3 of the 2009 Report. This new report shall describe the current heavy duty engine rebuild industry. Specifically, the new report shall answer the same questions as the 2009 Report (including those in Chapters 1 and 2 of the 2009 Report), but shall be based on data for 2012 (or 2011, if 2012 data are not available). The new report shall also include the highway-specific information contained in Chapters 1 and 2 of the 2009 Report.

The contractor shall identify all U.S. companies in the sectors described in this task that would be considered small entities and provide basic economic and operations data on them, to include number of employees and annual sales. The contractor shall estimate the fraction of each small entity's revenue that is derived from rebuilding engines.

Task 2. Nonroad Engines

The contractor shall provide a description of the rebuilding industry for nonroad engines, similar to the analysis described in Task 1 for highway engines. The contractor shall quantify

the number of companies involved in factory remanufacturing for nonroad engines and the annual number of rebuilds. The main focus of this task shall be for factory remanufacturing of nonroad diesel engines in the 50 hp to 750 hp range. The description of this market shall answer the same questions as the 2009 report, for these nonroad engines. The contractor shall also summarize the information available regarding other types of engine rebuilding for these engines and the information available regarding rebuilding of nonroad diesel engines under 50 hp, nonroad diesel engines over 750 hp other than those used in locomotives and nonroad spark-ignition engines. The contractor does not need to address rebuilding of engines used in locomotives.

The contractor shall identify all U.S. companies in the sectors described in this task that would be considered small entities and provide basic economic and operations data on them, to include number of employees and annual sales. The contractor shall estimate the fraction of each small entity's revenue that is derived from rebuilding engines.

Task 3. Glider Kits

The contractor shall provide a description of the glider kit market.[2] The description shall include the types of companies producing glider kits, the number of companies within each type, and the annual number of vehicles produced within each type. To the extent possible, the contractor shall describe the manner in which glider manufacturers assign vehicle identification numbers to the vehicles. The contractor shall summarize available information showing growth of this market, relative to sales of glider kits before 2010. The contractor shall also describe the sources of engines used in glider kits (such as owner provided engines or factory remanufactured engines) and the numbers of engines of each source type. This information shall be used to aid EPA in understanding and defining the impact a regulatory restriction would have on this industry; the contractor's analysis of the industry portion should therefore be presented in a level of detail similar to the 2009 report.

The contractor shall identify all U.S. companies in the sectors described in this task that would be considered small entities and provide basic economic and operations data on them, to include number of employees and annual sales. The contractor shall estimate the fraction of each small entity's revenue that is derived from producing glider kits.

Deliverables

1. Quality Assurance Project Plan (QAPP). The contractor shall submit a draft QAPP to the EPA WAM within 10 days of Work Plan submission. The QAPP shall detail data collection and analysis tasks and procedures for this work assignment. The EPA WAM shall review and comment on the draft QAPP. The contractor shall incorporate recommended changes and suggestions received before proceeding with technical work associated with the tasks contained in this work assignment. A final QAPP shall be submitted within 15 days after receipt of EPA comments. Information on completing a QAPP can be found at

[2] For purposes of this work assignment, the term "glider kit" means any substantially new highway vehicle that is produced without a new engine and that is intended to be powered by a used or remanufactured engine.

http://www.epa.gov/quality/at/extramural.html (general requirements) and /qatools.html (QMP/QAPP).

The final QAPP shall cover all aspects of this program as outlined on the EPA quality website. The QAPP shall have an appendix containing all applicable standard operating procedures (SOPs). The contractor shall adhere to all applicable SOPs and the QA procedures recommended therein.

2. Meetings. The contractor shall schedule a kick-off meeting with the EPA WAM prior to submission of the Work Plan. After submission of the Work Plan, the contractor shall hold weekly meetings with the EPA WAM by telephone conference. In these meetings, the contractor shall report progress, describe any new or unforeseen circumstances, and raise issues regarding the execution of the work assignment. The EPA WAM shall respond to questions, provide information, and raise or clarify technical issues or provide technical direction. The contractor shall contact EPA prior to beginning a given task, as well as prior to engaging in any substantive data searches.

3. Reports. The contractor shall prepare draft reports at the completion of each task identified in this work assignment, and submit these draft reports to the EPA WAM for review. After receiving EPA comments on draft reports for each task, the contractor shall prepare a single, unified final report that incorporates EPA's comments and any pertinent additional information available to the contractor. The level of detail and information included in these deliverable reports shall be comparable to that found in the attached 2009 Report. The contractor shall submit the final report two weeks after receipt of EPA's comments on the last draft report.

4. Schedule. The contractor shall collect information and prepare reports according to the following schedule:

Task	Date
Task 1 Draft Report	2 weeks after work plan approval
Task 2 Draft Report	4 weeks after work plan approval
Task 3 Draft Report	6 weeks after work plan approval
Final Report	2 weeks after receipt of EPA comments

NON-DISCLOSURE AGREEMENT

All documentation acquired and/or provided by EPA or generated as a result of this project shall be under the control of the U.S. EPA Assistant Administrator for Air and Radiation, or his or her designated representative, and shall not be released by the Contractor to any other source without specific approval by U.S. EPA.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-07

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013 Base Option Period Number 1	Continuation of Aerosol Genera

Contractor: ICF INCORPORATED, L.L.C.

Specify Section and paragraph of Contract SOW: Tasks 3b, 3c, 3d Nonroad; Task 7 Air Toxics/Pollut

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 10/01/2012 To 06/30/2013

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
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Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 02/01/2012 To 09/30/2013		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Bob Giannelli (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4708 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Matthew Growney (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2029 FAX Number: 513-487-2109

PERFORMANCE WORK STATEMENT

A. EPA Contract:	EP-C-12-011
B. Work Assignment (WA):	1-07
C. Issuing Office:	EPA Office of Transportation and Air Quality (OTAQ) 2000 Traverwood Dr. Ann Arbor, Michigan 48105
D. Contractor:	ICF International 9300 Lee Highway Fairfax, VA 22031-1207
E. Statement of Work:	Continuation of the Development of an Aerosol Generator for Use as a Calibration and Test Standard
F. Work Assignment Managers (WAM)	Dr. Bob Giannelli 734-214-4708 giannelli.bob@epa.gov
Alternate WAM	Christine Brunner 734-214-4287 brunner.christine@epa.gov

I. BACKGROUND

Over the past several years, the Environmental Protection Agency (EPA) has developed an aerosol or particulate matter (PM) generator that has been used in developing measurement allowances for emissions from heavy-duty in-use diesel engines. This system was designed to produce aerosols that mimic the characteristics of those emitted from combustion sources that use hydrocarbon-based fuels. The PM generator is designed to finely control the aerosols by chemical species, concentration, particle number and size distribution. It was envisioned to produce a wide spectrum of carbon-based, hydrocarbon-based, sulfate-based and nitrate-based aerosols that are known to be emitted from internal combustion engines. Using the PM generator, the measurement characteristics of a PM sampling system and the instrument that measures particulate matter mass and/or Particle Number (PMn) emissions from a combustion engine can be better quantified in terms of the particular species and size of the PM that is being measured.

This work assignment (WA) continues and expands upon the work started under WA 0-07 of contract EP-C-12-011.

II. OBJECTIVE

The aerosol generator has proven to provide stable concentrations of both soot aerosols and aerosols with a combination of soot and volatile components. With this system, the EPA is interested in having the contractor conduct experiments to determine what effects the sampling system and measurement instrument have on the characteristics of the particulate mass (PMm) and particulate number (PMn) being measured. This work is in support of the development of future test procedures for the measurement of total PMn. Specifically, this work should provide the data necessary to evaluate the performance of phase partitioning and loss models which may be used to select the thermodynamic and other sampling conditions for a future laboratory PMn measurement procedure. The procedure shall include all PMm components (elemental carbon, OC, ions, etc.) and shall reflect the characteristics of freshly diluted exhaust that has been emitted along a roadway. The goal of this work assignment is to identify the source of any sampling artifacts (both positive and negative).

III. SCOPE OF WORK

The Contractor shall provide support in the task areas below, continuing from the effort started under WA 0-07.

Task 1: Evaluate Simplified Sampling System

Typical PMm and PMn sampling systems contain the following two main components: a raw exhaust diluter and transport tubing that transports the diluted sample to one or more measurement instruments.

Sub-Task 1a: Test matrix. The contractor shall design a test matrix to quantify the source emissions rates for a number of conditions that represent the range of concentrations and volatilities of species found in freshly diluted internal combustion engine exhaust. The contractor shall consider a number of soot concentrations and a number of individual hydrocarbon volatilities and a number of dilution ratio, flow rate, and temperature conditions. To avoid confounding results, it is recommended that the test matrix evaluate approximately five different hydrocarbons spanning the 95% gas to 95% PM range of volatility (for the conditions tested), but only one pure hydrocarbon should be emitted at a time.

Sub-Task 1b: Evaluate Sampling System. For each condition of the test matrix from sub-task 1a, the contractor shall analyze the mass of PM and sorbed species collected by the analytical technique(s) and by the sampling system itself.

Sub-Task 1c: Status report. The contractor shall provide a brief (e.g., less than 5-page) summary of the results and the data in support of the results of Task 1.

Task 2: **Sampling for cryo-Transmission Electron Microscopy (TEM) and High Resolution Transmission Electron Microscopy (HRTEM) analyses**

To develop the Jing minicast and catalytic stripper combination soot output operational parameters for the diesel engine-like, extended aggregate particles, the contractor shall conduct PM sampling for cryo-TEM analyses.

In a previous TEM analysis of soot production by the Jing minicast and catalytic stripper combination, the soot was found to be comprised of extended and compact aggregate particles. The extended aggregate soot particles are more representative of diesel engine exhaust soot. Additionally, the opacity levels of the TEM images indicate differing chemical composition of the soot.

Sub-Task 2a: TEM AND HRTEM analyses. The contractor shall conduct sampling with a high resolution (sub-nanometer/ angstrom scale) transmission electron microscope (HRTEM) to possibly resolve the chemical species for these differing soot opacity levels as seen by the nanometer scale TEM.

a.) The contractor shall conduct a survey study of the Jing minicast and catalytic stripper combination soot output to determine the range of operational parameters (oxygen to fuel ratio, flame temperature, and pressure) at which the extended aggregate particles are produced. This survey study will cover a wide range of possible operational parameters for the Jing minicast and catalytic stripper combination. This can be done with a TEM sampling technique that does not sample uniformly over the entire size distribution.

b.) The contractor shall use the Jing minicast and catalytic stripper combination operational parameters determined in a.) above to conduct a more refined study of the operational parameters for soot production with a TEM with a sampling technique that samples the soot particles more uniformly over the particle size range. In this study, the range of operational parameters shall be better defined and in a more limited range. More time can be spent collecting data that helps define the operational parameters to a well resolved, finite range.

c.) The contractor shall study the soot morphology with a high resolution (sub-nanometer/ angstrom scale) transmission electron microscope (HRTEM) to better characterize the differing opacity levels of the soot observed with the current nanometer scale resolution TEM being used in a.) and b.) above. The differing opacity levels are an indication that the soot is composed of more than simply layered graphitic lattices.

Sub-Task 2b: Status report. The contractor shall provide a brief (e.g., less than 5-page) summary of the results and the data in support of the results of Task 2.

Task 3: Characterize sulfuric acid generation system and repeat Task 1 and 2 with Sulfuric Acid

Task 3 shall be initiated upon receipt of written technical direction from the EPA WAM.

The contractor shall characterize the range of PM mass and size distributions generated by the sulfuric acid nucleation system and then repeat Task1b. The contractor may need to develop a different sampling and analytical technique versus the system developed for Task 1.

Sub-Task 3a: The sulfuric acid precursor, SO3, is produced through catalysis of SO2 with O. The contractor shall monitor the SO3 production by using an SO2 analyzer downstream of the catalytic cell.

Sub-Task 3b: Status report. The contractor shall provide a brief (e.g., less than 5-page) summary of the results and the data in support of the results of Task 3.

Task 4: Inverse Gas Chromatography

Task 4 shall be initiated upon receipt of written technical direction from the EPA WAM.

The contractor shall select a number of transport tubing materials, soots, and semi-volatile hydrocarbons for Inverse Gas Chromatography analysis to determine the surface energies and solvation energies of these materials. The materials shall be analyzed to determine both their polar and non-polar net attractive forces, which govern the sorption mechanisms under investigation (i.e., adsorption and absorption).

Sub-Task 4a: The contractor shall consult with technical experts and subcontractors as needed to develop appropriate sample preparation and sampling techniques to prepare the samples for inverse gas chromatography analyses. The contractor shall ensure sufficient repeat analyses to ascertain statistical significance ($\leq$10% variability) of the results.

Sub-Task 4b: The contractor shall conduct sampling and sampling preparation for inverse chromatography analyses.

Sub-Task 4c: Status report. The contractor shall provide a brief (e.g., less than 5-page) summary of the results and the data in support of the results of Task 4.

Task 5: Multi-physics Software for Modeling PM Generator Transport Kinematics and Dynamics

Sub-Task 5a: The contractor shall model the fluid flow, thermal characteristics, and chemistry of the processes being studied with the PM generator under Tasks 1 through 3. The software used to generate these models shall be able to analyze the physical processes of the PM generator, and shall contain modules for computational fluid dynamics (CFD), heat transfer, particulate matter

transport, and chemical analysis of the gaseous, particulate and sampling train components. The models developed here shall be validated with the test results from Tasks 1 through 3.

Sub-Task 5b: Status report. The contractor shall provide the models developed, a brief (e.g., less than 5-page) summary of the results, and the data in support of the results of Task 5.

IV. DELIVERABLES

1. Quality Assurance Project Plan (QAPP).

The contractor shall submit a draft QAPP to the EPA WAM within 30 days of Work Plan submission. The QAPP shall detail data collection and analysis tasks and procedures for this work assignment. The QAPP approved under WA 0-07 may be used as a starting point, modified to include additional activity contained in this WA 1-07. The EPA WAM shall review and comment on the draft QAPP. The contractor shall incorporate recommended changes and suggestions received before proceeding with technical work associated with the tasks contained in this work assignment. A final QAPP shall be submitted within 15 days after receipt of EPA comments. Information on completing a QAPP can be found at http://www.epa.gov/quality/at/extramural.html (general requirements) and /qatools.html (QMP/QAPP).

The final QAPP shall cover all aspects of this test program as outlined on the EPA quality website. The QAPP shall have an appendix containing all applicable standard operating procedures (SOPs). The contractor shall adhere to all applicable SOPs and the QA procedures recommended therein.

2. Bi-Weekly Progress Reports.

The contractor shall provide the EPA WAM with brief bi-weekly status reports via telephone conference or email during the period of performance. The progress report shall indicate the progress achieved in the concluded weeks, technical problems encountered, solutions to those problems, and projected activity for the upcoming weeks. Before proceeding with any solution to a problem, the contractor shall report the problem and consult with the EPA WAM concerning the scope of the solution. The bi-weekly progress report shall also include an estimate of the percentage of each task completed to date, and the resources (level of effort and cost) expended on each task. The contractor shall notify the EPA WAM immediately if they encounter any equipment failures that cannot be remedied, problems that may impact the quality or on-time receipt of deliverables, or unavailability of items required for this work assignment.

3. Technical Reports.

The contractor shall provide the EPA WAM with a brief Technical Report upon completion of each task, where specified. Depending on the complexity of the subject matter, the EPA WAM will provide written technical direction on whether these reports shall be in the form

of a presentation or a formal written document. Written products shall be delivered in formats specified by the EPA WAM (e.g., Word, Excel).

4. Data.

The contractor shall provide to the EPA WAM test and modeling data that supports the results of all the tasks within 45 days of completion of the laboratory and modeling work defined in the Tasks above.

5. Final Report.

The contractor shall provide to the EPA WAM a draft final report summarizing the results of all the tasks within 30 days of completion of the laboratory and modeling work defined in the Tasks above. The contractor shall deliver the final report within 15 days from the day that the EPA WAM has delivered the reviewed draft report back to the contractor.

6. Final Presentation.

The contractor and/or key sub-contractors shall travel to EPA's Office of Transportation and Air Quality (OTAQ), 2000 Traverwood Dr., Ann Arbor, Michigan 48105, for a one-day meeting to present key findings and to conduct a question and answer meeting to inform OTAQ technical experts of the results and conclusions of this work.

Schedule of Deliverables

Steps	**Completion Date**
QAPP Submission	Within 10 calendar days of Work Plan submission
Final QAPP	Within15 calendar days of receiving EPA comments
Complete all Tasks	June 30, 2013
Draft Final report	Within 30 days of completion of all tasks
Final report	Within 15 calendars days of receiving EPA comments
Final presentation	Within 45 days of completion of Final Report

NON-DISCLOSURE AGREEMENT

All documentation acquired and/or provided by EPA or generated as a result of this project shall be under the control of the U.S. EPA Assistant Administrator for Air and Radiation, or his or her designated representative, and shall not be released by the Contractor to any other source without specific approval by U.S. EPA.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-07

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2016 Base Option Period Number 1	Dev of Aerosol Generator

Contractor: ICF INCORPORATED, L.L.C.

Specify Section and paragraph of Contract SOW: Task 3, Task 7

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 10/01/2012 To 06/30/2013

Comments:
In accordance with the Stop Work Order issued on October 15, 2012, this amendment de-scopes and terminates all tasks under this work assignment. No further action on the part of the Contractor is required.

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

	Cost/Fee:	LOE:
Contract Period: 02/01/2012 To 09/30/2016		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Bob Giannelli (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4708 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Sandra Savage (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2046 FAX Number:

PERFORMANCE WORK STATEMENT

A.	EPA Contract:	EP-C-12-011
B.	Work Assignment (WA):	1-07, Amendment 1
C.	Issuing Office:	EPA Office of Transportation and Air Quality (OTAQ) 2000 Traverwood Dr. Ann Arbor, Michigan 48105
D.	Contractor:	ICF International 9300 Lee Highway Fairfax, VA 22031-1207
E.	Statement of Work:	Continuation of the Development of an Aerosol Generator for Use as a Calibration and Test Standard
F.	Work Assignment Managers (WAM)	Dr. Bob Giannelli 734-214-4708 giannelli.bob@epa.gov
	Alternate WAM	Christine Brunner 734-214-4287 brunner.christine@epa.gov

OBJECTIVE: In accordance with the Stop Work Order issued on October 15, 2012, this amendment de-scopes and terminates all tasks under this work assignment. No further action on the part of the Contractor is required.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-08

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013	Travel Efficiency Assessment M
	Base Option Period Number 1	

Contractor: ICF INCORPORATED, L.L.C.

Specify Section and paragraph of Contract SOW: 7a

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 11/29/2012 To 09/30/2013

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*): ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period: 02/01/2012 To 09/30/2013 — Cost/Fee: — LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: — Cost/Fee: — LOE:

Cumulative Approved: — Cost/Fee: — LOE:

Work Assignment Manager Name: David Bizot (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4432 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: (Signature) (Date)	Branch/Mail Code: Phone Number: FAX Number:
Contracting Official Name: Angela Lower (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2036 FAX Number:

PERFORMANCE WORK STATEMENT

Work Assignment (WA):	1-08 (EP-C-12-011)
Title:	Travel Efficiency Assessment Methodology Case Studies
Contractor:	ICF International 9300 Lee Highway Fairfax, VA 22031-1207
Work Assignment Manager: (WAM)	David Bizot 2000 Traverwood Drive Ann Arbor, MI 48105 Phone: 734-214-4432 Fax: 734-214-4052 Email: bizot.david@epa.gov
Alternate WAM:	Astrid Larsen 2000 Traverwood Drive Ann Arbor, MI 48105 Phone: 734-214-4812 Fax: 734-214-4052 Email: larsen.astrid@epa.gov
Period of Performance:	November 29, 2013 to September 30, 2013

BACKGROUND

The Transportation and Climate Division (TCD) of EPA's Office of Transportation and Air Quality (OTAQ) provides analysis, guidance and technical assistance on transportation policy and program effects on mobile source emissions and air quality to Federal, State, and local agencies and governments. These stakeholders are increasingly interested in evaluating the effectiveness of travel efficiency (TE) and other related strategies for reducing criteria pollutant and precursor emissions, and greenhouse gases (GHG). In March 2011, TCD published a report titled *Potential Changes in Emissions Due to Improvements in Travel Efficiency*. This report outlines a peer reviewed methodology for evaluating the emission benefits of travel efficiency strategies, and will serve as a guide for conducting the case studies described in this work assignment.

PURPOSE AND OVERVIEW

The objective of this work assignment is for the contractor to provide technical assistance for GHG planning and TE assessment case studies based upon the Travel Efficiency Assessment Methodology (TEAM).[1] The contractor previously assisted EPA in preparing for these case studies in Work Assignment 0-08; specifically, state and local areas were identified and evaluated as potential candidates for technical assistance. Under this work assignment (1-08), the contractor shall secure an agreement from these state and local agencies to participate in the case studies, develop a plan to coordinate a stakeholder process, perform the analyses, document the experience and technical results in draft and final memoranda, and create a final report.

These case studies will integrate the use of the Trip Reduction Impacts of Mobility Management Strategies (TRIMMS) transportation/land-use sketch model and EPA's Motor Vehicle Emissions Simulator (MOVES) emissions model to demonstrate: (1) how TEAM can be adapted and used cost-effectively to create state, regional or local inventories of on-road GHG and criteria emissions, and (2) the feasibility of scenario analysis as a useful source of information on the effectiveness of travel efficiency strategies for reducing travel activity and emissions. While sketch tools are not a substitute for traditional comprehensive transportation, land-use, and air quality modeling, they can serve an important role by allowing local officials to analyze a range of travel efficiency strategies (such as pricing, land-use, and transit) which cannot easily be modeled with traditional approaches such as regional travel demand forecasting models.

TASK 1: STAKEHOLDER IDENTIFCATION AND PROCESS DEVELOPMENT

EPA WAM will provide the contractor with a list of three state and local area agencies (the "selected agencies") who have been selected to receive technical assistance under this work assignment.

In consultation with the EPA WAM, the contractor shall work with the each of the selected agencies to identify the specific representatives of the selected agency, as well as other stakeholders in that area, who shall be involved in the selection of the travel efficiency strategy scenarios that shall be modeled and the data necessary to model these scenarios in accordance with this work assignment. Stakeholder participants shall include a representative from the agency that submitted the letter of interest and any partner agency identified in that letter. The contractor shall work with such representatives to determine if representatives from other state or local agencies, such as air quality, energy, transportation and transit agencies, as well as land-use agencies, should also be included as stakeholders in the planning and conduct of the case study.

In collaboration with the EPA WAM, the selected agencies, and any other stakeholders identified above, the contractor shall develop and conduct a coordinated process to determine consensus on the key inputs and assumptions for each selected agency's case study. The case study for each

[1] TEAM is a methodology developed by EPA, which combines the use of a transportation sketch planning tool that estimates changes in travel activity with estimates of emission rates from MOVES, to produce emissions estimates from travel activity. Changes in travel activity, estimated for representative urban areas of the country, are applied to similar urban areas and then scaled up to estimate changes travel activity for the entire nation. Emissions estimated by MOVES are combined with the estimated change in travel activity to estimate changes in emissions.

selected agency shall consist of one or more TE strategy scenarios that shall be modeled and analyzed for some future year (see Task 2 for complete details about these scenarios). The analysis year for each scenario in any area must be the same so that the results can be compared to one another, but the analysis years can differ among the selected agencies, depending on the year chosen by the participating stakeholders in each area.

The contractor's plan for conducting this process shall describe how the necessary data for completing each analysis shall be identified, collected, and prepared for each selected agency's case study. Analytical metrics, including baselines, analysis years, and appropriate data (such as vehicle miles traveled, trip volumes, mode shares, travel costs, population and densities), to represent strategy scenario implementation shall be identified. The process shall allow sufficient time for interagency review of and agreement on the case study scenarios and model inputs. All meetings shall be conducted via conference call or web meeting.

Deliverables

1. Draft memo describing the plan for the stakeholder process for reviewing strategies, modeling inputs, and analysis of results for each selected agency
2. Final memo describing the plan for the stakeholder process for reviewing strategies, modeling inputs, and analysis of results for each selected agency
3. Draft list of stakeholders and potential case study scenarios for each selected agency
4. Final list of stakeholders and potential case study scenarios for each selected agency

TASK 2: EVALUATION OF TRANSPORTATION STRATEGIES USING THE TEAM METHOD

For each of the three selected agencies, the contractor shall:

Subtask 1.

The contractor shall coordinate with the EPA WAM, the selected agency, and any stakeholders to establish the modeling baseline and agree on up to six transportation strategy scenarios to be analyzed as part of each case study.[2] One scenario shall be "business as usual" to reflect a future year base case against which the other scenarios can be compared. This "business as usual" scenario shall reflect the land use changes and growth in transportation that the MPO is currently anticipating for the chosen analysis year. The other scenarios shall include any transportation control measure or other VMT-reducing strategy, or grouping of strategies, that are not already included in the "business as usual" scenario that TRIMMS is capable of analyzing. Such strategies could include:

- Travel demand management measures
- Land use strategies
- Transit fare discounts and service improvements
- Road pricing measures (including parking charges and mileage-based fees)
- Any combination of the above strategies.

[2] A maximum of 18 transportation strategy scenarios (six for each of the three selected agencies) could therefore potentially be analyzed under this subtask.

The contractor shall coordinate with the EPA WAM, the selected agency, and any stakeholders, on how to best specify each scenario to be analyzed, including the appropriate model input and output values. The contractor shall work with the selected agency and any stakeholders to identify travel data and any other data necessary to run the TRIMMS and MOVES models for the chosen scenarios. The contractor shall provide a draft copy of all proposed model inputs to the EPA WAM, the selected agency, and any stakeholders. These inputs will be reviewed by the EPA WAM, the selected agency, and any stakeholders and revised as necessary based on their review. The final inputs shall be approved by the EPA WAM prior to the contractor starting any modeling. Modeling and analysis shall not begin until EPA WAM has determined that sufficient agreement has been reached among EPA, the selected agency, and any stakeholders on the scenarios to be modeled and the modeling specifications.

Subtask 2.

The contractor shall model and analyze each strategy scenario using, to the extent practical, the TEAM methodology described and used in Contract EP-C-06-094, Work Assignment 2-01 (note that the geographic scope for modeling and analysis shall not be performed at the national scale, as was done in that work assignment). The contractor shall use TRIMMS to perform the transportation sketch modeling. The MOVES emissions model shall be run at the county scale using inputs based on local data specific to each participating area, to the extent practicable, and shall adhere to the latest EPA guidance for estimating on-road greenhouse gas emissions.[3] Any recommended deviations from the aforementioned methodology and guidance shall be reported to the EPA WAM as soon as they are identified; any such deviations shall only be followed upon receipt of EPA WAM approval.

Subtask 3.

Following completion of the TRIMMS and MOVES modeling for each selected agency, draft technical results shall be submitted to the EPA WAM using the same tabular format used to publish the results in the report: *Potential Changes in Emissions Due to Improvements in Travel Efficiency.* These results shall include estimates for Volatile Organic Compounds (VOC), Nitrogen Oxides (NOx), Fine Particulate Matter (PM2.5), and Carbon Dioxide (CO2).

Following review and approval of the technical results described above, within 14 days the contractor shall submit draft memoranda (one for each selected agency) describing and documenting the modeling assumptions, strategies assessed and results. In addition to the draft memoranda, the contractor shall submit the MOVES RunSpec file for each scenario analyzed and the MOVES input and output databases associated with each MOVES run. The contractor shall name these three items similarly so that it is clear which files and databases are associated with one another.[4] In addition, if requested by a selected agency and approved by the EPA WAM, the contractor shall provide a one day, on-site briefing of the technical results and draft

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[3] On the date of this Performance Work Statement, the latest available guidance, *Using MOVES for Estimating State and Local Inventories of On-Road Greenhouse Gas Emissions and Energy Consumption – Draft, January 2012,* could be found at http://www.epa.gov/otaq/stateresources/ghgtravel.htm EPA plans to finalize this guidance in the near future.

[4] For example, the MOVES RunSpec name could be "areaname_scenario1.mrs," the input database "areaname_ scenario1_in," and the output database "areaname_scenario1_out."

memorandum to each selected agency. This on-site briefing could include travel by 1 contractor staff member to the location of each of the three selected agencies.

The contractor shall incorporate any agency and EPA comments in a final memo within 14 days of receiving comments.

Deliverables

5. Proposed TRIMMS and MOVES inputs for each case study scenario
6. Final TRIMMS and MOVES inputs for each case study scenario
7. MOVES RunSpec file, input database, and output database for each case study scenario
8. Results in tabular format for each case study scenario
9. Draft results memoranda with assumptions, strategies and results for each selected agency
10. On-site briefing to each of the selected agencies, subject to EPA WAM approval
11. Final results memoranda with assumptions, strategies and results for each selected agency

TASK 3: REVIEW OF EXISTING GREENHOUSE GAS ANALYSES

As part of the case study of each selected agency, the contractor shall review and describe any regional-scale greenhouse gas analyses the selected agency (or any associated stakeholder) may have recently completed in the area, documenting any differences between the methodology used in any such analyses and the method described by TEAM. This task need not necessarily include a comparison of specific quantitative results between any existing greenhouse gas analyses and the TEAM results produced in Task 2 in cases where the methodologies are not comparable, but shall include a qualitative evaluation of the results and a discussion about how the different methodologies and source data and assumptions could influence the results. The contractor shall include the results of this task in the appropriate case study report (see Task 4).

Deliverables

12. Draft memo identifying other regional-scale greenhouse gas analyses and comparing methodologies for each selected agency
13. Final memo identifying other regional-scale greenhouse gas analyses and comparing methodologies for each selected agency

TASK 4: CASE STUDY REPORTS

The contractor shall incorporate the results of Tasks 1-3 into a draft report. The memoranda for the previous tasks shall form the basis of draft report, which shall include, at a minimum:

- An overall summary and general conclusions, considering the results of all three case studies;
- Self-contained sections containing the results of each selected agency's case study, including the stakeholder process involved, the strategies evaluated in each case study, the assumptions and methodologies used in the strategy evaluations, evaluation of the adherence or deviation from TRIMMS and MOVES guidance, and any challenges (technical or otherwise) encountered and how they were addressed; and

- Information, including any lessons learned, determined to be useful to other state or local areas wishing to perform its own analysis of GHG or criteria emissions reductions for various travel efficiency scenarios.

The EPA WAM will review the initial version of the draft report. After incorporating any EPA comments received from the EPA WAM, the contactor shall then send the draft report to the selected agencies (and associated stakeholders, as needed) for their review and comment. After receiving comments from the selected agencies and any stakeholders, the contractor shall arrange for and facilitate any discussions between the EPA WAM, the selected agencies, and any stakeholders, via conference call or web- based meeting, needed to develop consensus on the final text.

After receiving final comments on the draft report from the EPA WAM, the selected agencies, and any stakeholders, the contractor shall develop a final report for this task. This final report shall respond to any comments received on the draft. The contactor shall submit a draft of this final report to the EPA WAM for review and comment; upon receiving comments, the contractor shall revise the final report and submit a final copy within 14 days.

Deliverables

14. Draft final report
15. Revised final report

CONSOLIDATED DELIVERABLES AND SCHEDULE

Note: due dates are notional and subject to change based on contractor work plan and subsequent discussions and agreement between contractor and EPA WAM.

Deliverable(s)	**Schedule/Due Date**
Quality Assurance Project Plan	10 days after work plan approval
Task 1	
Deliverable 1: Draft memo describing the planned stakeholder engagement and scenario development process	30 days from initiation
Deliverable 2: Final memo describing the planned stakeholder engagement and scenario development process	45 days from initiation
Deliverable 3: Draft list of stakeholders and potential case study scenarios	60 days from initiation
Deliverable 4: Final list of stakeholders and potential case study scenarios	75 days from initiation
Task 2	
Deliverable 5: Proposed TRIMMS and MOVES modeling inputs	90 days from initiation
Deliverable 6: Final TRIMMS and MOVES modeling inputs	105 days from initiation
Deliverable 7: MOVES RunSpecs and databases for each case study scenario	120 days from initiation
Deliverable 8: Tabular results for each case study scenario	120 days from initiation

Deliverable 9: Draft modeling results memoranda for each selected agency	135 days from initiation
Deliverable 10: On-site briefing of modeling results to each selected agency (if approved by EPA WAM)	TBD; approximately 150 days from initiation
Deliverable 11: Final modeling results memoranda for each selected agency	165 days from initiation
Task 3	
Deliverable 12: Draft GHG comparison memo	135 days from initiation
Deliverable 13: Final GHG comparison memo	165 days from initiation
Task 4	
Deliverable 14: Draft final report	180 days from initiation
Deliverable 15: Revised final report	240 days from initiation

DISTRIBUTION AND FORMAT OF DELIVERABLES

The contractor shall deliver all work assignment deliverables, including status reports and interim products, in an appropriate electronic format (e.g., Microsoft Word, Excel, and Acrobat). MOVES input and output databases can be submitted as MySQL databases. This applies to all tasks under this work assignment unless otherwise specified in written technical direction by the EPA WAM.

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-10

☐ Other ☐ Amendment Number:

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013	Recording Aircraft Operations
	Base Option Period Number 1	

Contractor: ICF INCORPORATED, L.L.C.

Specify Section and paragraph of Contract SOW: Task 7a

Purpose:
- [X] Work Assignment
- [ ] Work Assignment Amendment
- [ ] Work Plan Approval
- [ ] Work Assignment Close-Out
- [ ] Incremental Funding

Period of Performance: From 10/02/2012 To 09/30/2013

Comments:

☐ Superfund — Accounting and Appropriations Data — [X] Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
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4										
5										

Authorized Work Assignment Ceiling

Contract Period: 02/01/2012 To 09/30/2013 — Cost/Fee: — LOE:

This Action:

Total:

Work Plan / Cost Estimate Approvals

Contractor WP Dated: — Cost/Fee: — LOE:

Cumulative Approved: — Cost/Fee: — LOE:

Work Assignment Manager Name: Meredith Pedde (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4748 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: Jose Ortiz (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2831 FAX Number: 513-487-2109
Contracting Official Name: Angela Lower (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2036 FAX Number:

STATEMENT OF WORK

WORK ASSIGNMENT	1-10, EPA Contract [EP-C-12-011]
A. Issuing Office:	Environmental Protection Agency
B. Contractor:	ICF International 9300 Lee Highway Fairfax, VA 22031-1207
C. Statement of Work:	Recording Aircraft Operations at General Aviation Airports with Lead Monitors
D. Work Assignment Managers (WAM):	Meredith Pedde Tel: 734-214-4748 Fax: 734-214-4939 Email: pedde.meredith@epa.gov
Alternate WAM:	Rich Cook Tel: 734-214-4827 Email: cook.rich@epa.gov
E. Period of Performance:	October 1, 2012 – September 30, 2013

BACKGROUND

Tetraethyl lead is added to aviation gasoline (avgas) which is used in most piston-engine powered aircraft. Lead (Pb) emissions from the use of leaded aviation gasoline accounts for approximately half the air emission inventory for lead. In October 2006, EPA received a petition from Friends of the Earth (FOE) requesting that the Agency find that aircraft lead emissions may reasonably be anticipated to endanger the public health or welfare, and to take action to control lead emissions from piston-engine aircraft. FOE also requested that if there was insufficient information, the EPA should commence a study of the issue. This work continues EPA's investigation and study of lead emitted by piston-engine aircraft and the potential impact on public health and welfare.

Additional monitoring described in this Statement of Work is to address the evaluation of the variation in exposure estimates provided by single versus multi-point monitoring at the most relevant locations at an airport where piston-engine aircraft operating on leaded fuel are active.

This work assignment builds on two previous work assignments: Work Assignment No. 0-10 under EPA contract EP-C-12-011 and Work Assignment No. 3-66 under EPA contract EP-C-09-009. The data collected under Work Assignments No. 3-66 and 0-10 shall be used to complete the tasks detailed in this work assignment. However, the contractor shall not duplicate any work previously performed.

OBJECTIVE

The purpose of the tasks described in this work assignment is to:

1) collect data on the activity of piston engine aircraft at selected airports on days when ambient air lead concentrations are also being collected,
2) collect samples of aviation gasoline at the same airports, and
3) collect ambient air lead samples from at least one airport for 14 days.

TASKS

Task 1. Count aircraft activity at airports with lead monitors

The Contractor shall count the number of aircraft landing and taking off from the airports identified in Table 1 for 5 days and for 4 days at the airports identified in Table 2. For each operation (landing and take-off), the Contractor shall record the runway end used by each aircraft (for landing or take-off) by recording the runway heading, and where necessary if an airport has parallel runways, the additional runway identifier (e.g., 31R). For each aircraft landing or departing from the runway end at which the lead monitor is located, the Contractor shall record the aircraft tail number, an observation of the aircraft type (e.g., jet, turboprop, fixed wing piston aircraft or a helicopter and whether the helicopter was powered by jet engines or piston engines) and any observations that might help EPA to understand the activity of aircraft at each airport as well as any unusual events during the days observed (e.g., several airplanes lined up waiting for take-off, take-off by an unusually large piston aircraft such as a "warbird," or an event at the airport such as an air show that would increase the number of operations above normal). Observations shall be recorded chronologically during the day during the hours the airport is open with a time stamp for each hour of observation. The Contractor shall instruct the individuals counting aircraft to be stationed near the end of the runway where the lead monitor is located. The Contractor shall instruct the individuals counting aircraft not to go near the lead monitor itself and to follow all guidelines communicated by airport personnel to insure safety of the individual recording activity as well as pilots and other personnel. The Contractor shall provide the cost estimates separately for each airport shown in Table 1.

Table 1. Airports where the Contractor shall count aircraft activity for 5 days and collect avgas samples (described in Task 2 and Task 4).

Airports	
Brookhaven Municipal Airport, Brookhaven, NY	Pryor Field Regional Airport, Limestone County, AL
Stinson Municipal Airport, San Antonio, TX	Auburn Municipal Airport, Auburn, WA
Harvey Field, Snohomish County, WA	

Table 2. Airports where the Contractor shall count aircraft activity for 4 days and collect avgas samples (described in Task 2 and Task 4).

Airports	
McClellan-Palomar, Carlsbad, CA	Palo Alto Airport, Palo Alto, CA
San Carlos Airport, San Carlos, CA	

Currently, state and local air quality monitoring agencies are monitoring at 15 airports every sixth day. Table 3 identifies the dates when lead monitoring is occurring from October 2012 – March 2013.

The Contractor shall provide separate cost estimates for the following 2 scenarios for collecting the 5 days worth of airport operation observations:

1) The Contractor shall collect the 5 days of airport operation observations on five of the dates listed in Table 3, at each of the airports listed in Table 1, of this work assignment.
2) The Contractor shall collect the 5 days of airport operation observations, for each of the airports listed in Table 1, on five consecutive days (as opposed to the 5 days listed in Table 3). The Contractor shall ensure that at least one of the 5 consecutive days includes one of the lead monitoring dates listed in Table 3.

For the airports listed in Table 2, the Contractor shall collect the 4 days of airport operation observations on 4 of the dates listed in Table 3.

Table 3. Lead Air Monitoring Sampling Days October 2012 – March 2013 at Airports.

October, November, December	**January, February, March**
October 6, 2012 Saturday	January 4, 2013 Friday
October 12, 2012 Friday	January 10, 2013 Thursday
October 18, 2012 Thursday	January 16, 2013 Wednesday
October 24, 2012 Wednesday	January 22, 2013 Tuesday
October 30, 2012 Tuesday	January 28, 2013 Monday
November 5, 2012 Monday	February 3, 2013 Sunday
November 11, 2012 Sunday	February 9, 2013 Saturday
November 17, 2012 Saturday	February 15, 2013 Friday
November 23, 2012 Friday	February 21, 2013 Thursday
November 29, 2012 Thursday	February 27, 2013 Wednesday
December 5, 2012 Wednesday	March 5, 2013 Tuesday
December 11, 2012 Tuesday	March 11, 2013 Monday
December 17, 2012 Monday	March 17, 2013 Sunday
December 23, 2012 Sunday	March 23, 2013 Saturday
December 29, 2012 Saturday	March 29, 2013 Friday

The Contractor shall conduct airport counts for the airports identified in Tables 1 and 2 so that the counting ends on or before the below dates, as to ensure that airport counts coincide with the period of ambient Pb monitoring at the airports.

Airport	**Date That Lead Monitoring May End**
Brookhaven:	October 5, 2012
Harvey Field:	December 28, 2012
Auburn Field:	December 28, 2012
Pryor Field:	January 3, 2013
Stinson:	July 2013
McClellan-Palomar:	March 15, 2013
Palo Alto:	February 2, 2013
San Carlos:	March 9, 2013

The Contractor shall update the EPA WAM monthly on the status of securing personnel to obtain the airport counts. The EPA WAM may provide a list of contacts for airport managers and state and local air monitoring agencies to assist the contractor. If it appears to be too challenging or logistically impossible to obtain aircraft counts from any of the airports in Tables 1 or 2, the EPA WAM, via written technical direction, may remove the particular airport from the list and select a different airport.

The Contractor shall inform the EPA WAM which airports will have aircraft counts conducted and when, so that EPA has at least one week advance notice.

The Contractor shall accomplish airport counts as soon as practical since operations by piston aircraft at many airports will decrease in the winter. If possible, the Contractor shall conduct observations at multiple airports simultaneously.

Under WA 0-10, the Contractor procured archived flight air traffic tracking data and live and archived air traffic tower audio data for the six airports listed in Table 4. The archived flight air traffic data report the aircraft tail number and time of departure and landing, while the air traffic tower audio provides information on the runway used during departure or landing. The Contractor shall analyze the previously collected data and for each of the 6 airports, the Contractor shall provide the EPA WAM with excel files that identify: the time of departure or landing for each operation, the runway end used by each aircraft (for landing or take-off), and the aircraft's tail number. The Contractor shall provide this information to EPA for 5 of the dates listed in Table 5 below.

Table 4. Airports at which the Contractor has already collected archived air traffic tower audio data and archived flight air traffic tracking data

Airports	
Centennial Airports, Denver, CO	Oakland County Int'l, Pontiac, MI
Merrill Field, Anchorage, AK	Republic, Farmingdale, NY
Nantucket Memorial, Nantucket, MA	Gillespie, San Diego, CA

Table 5. Lead Air Monitoring Sampling Days July 2012 – September 2012 at Airports.

July, August, September
July 2, 2012 Monday
July 8, 2012 Sunday
July 14, 2012 Saturday
July 20, 2012 Friday
July 26, 2012 Thursday
August 1, 2012 Wednesday
August 7, 2012 Tuesday
August 13, 2012 Monday
August 19, 2012 Sunday
August 25, 2012 Saturday
August 31, 2012 Friday
September 6, 2012 Thursday
September 12, 2012 Wednesday
September 18, 2012 Tuesday
September 24, 2012 Monday
September 30, 2012 Sunday

Task 2. Collecting meteorological data

The Contractor shall collect meteorological data on the days when aircraft are being counted. The data shall be provided to EPA WAM as hourly wind speed and wind direction. The data may be collected with a handheld device or similar technology.

Task 3. Collecting avgas samples

The Contractor shall collect at least one sample of avgas from each fuel supplier (fixed based operator) at each airport where aircraft are counted in-person (i.e., airports listed in Tables 1 and 2). The EPA WAM will provide the following: specifications for sample collection bottles and related supplies (will be issued by the EPA WAM as a technical direction), crimpers needed to seal sample containers (to be returned to EPA at the completion of the work assignment), sample collection protocol, and shipping drums (to be returned to EPA at the completion of the work assignment). The Contractor shall ship avgas samples to EPA for analysis.

Task 4. Air Quality Monitoring at a Selected Airport

The contractor shall collect ambient air samples for lead in PM2.5 at the Phoenix Deer Valley Airport in Phoenix, Arizona. Upon written technical direction by the EPA WAM, the contractor shall collect PM2.5 and alkyl-lead at one additional airport (e.g., the San Carlos airport in California or McClellan-Palomar in California). Samples shall be collected and analyzed for 14 days at two locations using battery-powered miniVol samplers. The ambient air sample site locations, the season in which to sample and other logistical details related to the air sampling will be determined in coordination with the EPA WAM.

In addition to collecting lead in PM2.5 data from the Phoenix Deer Valley Airport, the Contractor shall also prepare a cost estimate for collecting and analyzing ambient air samples for lead in PM2.5 and total vapor-phase alkyl lead (methyl- and ethyl-lead) at one additional airport. At this airport, there would only be one PM2.5 monitor. PM2.5 and vapor-phase alkyl lead samples shall be collected at the same location (co-located) for a period of 10 days. PM2.5 samples may be collected using the battery-powered miniVol sampler. The contractor shall coordinate with the EPA WAM to determine the appropriate sample collection and analysis method for alkyl lead.

The EPA WAM shall obtain the necessary approvals from airport authorities to conduct this monitoring. The Contractor shall prepare a separate report for this portion of the work assignment.

REPORTING DELIVERABLES

Quality Assurance Project Plan (QAPP): The QAPPs provided to EPA under Work Assignment No. 0-10 under EPA contract EP-C-12-011 and Work Assignment No. 3-66 under EPA contract EP-C-09-009 may be used as a starting point to satisfy the QAPP requirements for this work assignment. The contractor shall update this QAPP to account for any new tasks included in this work assignment. The contractor shall not commence work involving environmental generation data or use until the EPA WAM has approved the QAPP.

Conference calls: The Contractor shall provide status updates for the EPA WAM on securing personnel for airport activity counts weekly and shall initiate additional contact with the EPA WAM as needed to resolve questions and discuss technical issues encountered. The EPA WAM or designated alternate shall participate in these phone conferences.

Data files: The Contractor shall provide EPA WAM with Excel data files containing all aircraft observation data collected in Tasks 2 and 3, and any relevant notes taken by the person observing aircraft. These notes shall be sufficient to allow EPA to identify the airport, the day of observation, time of day, aircraft tail number, aircraft type if easily identified (e.g., airframe manufacturer and model), engine type if easily and positively recognized (e.g., piston or jet) and any observer's notes as described in Task 2. The Contractor shall also provide any notes and observations from the person collecting and shipping avgas samples. The Contractor shall summarize the meteorological data in Excel by airport, day, and hour and provide a graphical representation of wind direction on each day aircraft were counted, using a wind rose to display the percent of the time the wind was from each direction.

The schedule for task deliverables is as follows:

Deliverable: QAPP	July 25, 2012
Task 1 Deliverable: Aircraft activity at airports with lead monitors	February 28, 2013
Task 2 Deliverable: Meteorological data	February 28, 2013
Task 3 Deliverable: Avgas samples	Upon collection from each airport
Task 4 Deliverable: Air Quality monitoring from 1 or two airports	June 28, 2013

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-10

☐ Other ☒ Amendment Number: 000001

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013 Base Option Period Number 1	Recording Aircraft Operations

Contractor: ICF INCORPORATED, L.L.C.

Specify Section and paragraph of Contract SOW: Task 7a

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 10/02/2012 To 09/30/2013

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
02/01/2012 To 09/30/2013		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Meredith Pedde (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4748 FAX Number:
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code: Phone Number: 734-214-4285 FAX Number: 734-214-4821
Other Agency Official Name: Jose Ortiz (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2831 FAX Number: 513-487-2109
Contracting Official Name: Sandra Savage (Signature) (Date)	Branch/Mail Code: Phone Number: 513-487-2046 FAX Number:

PERFORMANCE WORK STATEMENT
CONTRACT NO. EP-C-12-011
WA 1-10 Amendment 1

Title: Recording Aircraft Operations at General Aviation Airports with Lead Monitors

Contractor:
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Period of Performance: October 2, 2012 – September 30, 2013

Background

Tetraethyl lead is used as an additive in aviation fuel for most piston-engine powered aircraft. Lead (Pb) emissions from the use of leaded aviation gasoline accounts for approximately half of the air emission inventory for lead. In October 2006, EPA received a petition from Friends of the Earth (FOE) requesting that the Agency find that aircraft lead emissions may reasonably be anticipated to endanger the public health or welfare, and to take action to control lead emissions from piston-engine aircraft. FOE also requested that if there was insufficient information, EPA should commence a study of the issue. This work builds on two earlier EPA work assignments and continues EPA's investigation and study of lead emitted by piston-engine aircraft and the potential impact on public health and welfare.

This work assignment builds on two previous work assignments: Work Assignment No. 0-10 under EPA contract EP-C-12-011 and Work Assignment No. 3-66 under EPA contract EP-C-09-009. The data collected under Work Assignments No. 3-66 and 0-10 shall be used to complete the tasks detailed in this work assignment. However, the contractor shall not duplicate any work previously performed.

EPA is amending WA 1-10 to add Tasks 5-8. The Performance Work Statement is amended as follows to add tasks 5 - 8. Tasks 5 -8 add the following work: modeling of lead emissions from piston-engine helicopters; modeling of 1 year of lead emissions from a constant number of piston-engine aircraft operations to allow EPA to assess the impact of meteorological conditions

on lead concentrations; finalizing the final report of ICF's evaluation of lead emissions at a general aviation airport; and, collecting ambient air lead samples from one airport for 14 days. Tasks 1-3 of the Contractor's work plan for WA 1-10 were approved on 11/19/12 and do not change as a result of these amendments. Task 4 was not approved. Task 4 had two parts: 2 weeks of TSP monitoring at an airport plus monitoring for alkyl lead at another airport. The new Task 8 in these amendments adds work for the contractor to monitor for alkyl lead (i.e., the second part of the original task 4).

TASKS

Task 5: Model only Helicopter Activity for 3-months at Reid-Hillview Airport
To isolate the impact of helicopter emissions on ambient lead concentrations, in addition to the additional receptors ICF has already added at 10 meter increments surrounding and downwind from the haypatch location where helicopters are modeled to depart from RHV, ICF shall also add receptors every 50 meters beyond the 200 meter distance. These receptors shall extend out to 500 meters from the haypatch area (therefore on-airport and off-airport receptors may be required). ICF shall provide EPA with a spreadsheet that includes the UTM coordinates for each receptor as well as the lead concentrations associated with those receptors and that result from helicopter emissions only. ICF shall use the above configuration to model only helicopter emissions for the 3-month period from January to March, 2010, using the meteorological data collected and prepared under earlier work assignments. ICF shall assume that 525 piston helicopter LTOs occur during the 3-month period. The LTOs shall be distributed amongst weekday and weekend days and hours using the temporal profiles developed under WA 3-66 under EPA contract EP-C-09-009.

The results of this task shall be included in an appendix to the final report, which is described in this document in Task 7. The appendix write-up shall include information on the helicopter activity data that was used in the model to generate the lead concentrations, identifying how the activity was assigned to weekday and weekend days and hours. The report shall identify the distance that lead concentrations during this time period from only helicopter emissions are elevated above background. The report shall also include a figure with a color-coded isopleth plot of the 3-month average ambient Pb concentration ($\mu g/m^3$) from the helicopter emissions, similar to those provided in the draft final report developed under WA 3-66 under EPA contract EP-C-09-009. The write-up in the appendix to the final report shall include a table with the 3-month lead concentrations ($\mu g/m^3$) at 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 250, 300, 350, 400, 450, and 500 meters. The report shall also include a table with the air quality factors (lead concentration in $\mu g/m^3$ divided by the number of piston LTOs modeled during the 3-month period) at the same distances.

In addition to describing this work in an appendix to the final report, ICF shall also provide EPA with a spreadsheet that includes the UTM coordinates for each receptor as well as the lead concentrations associated with those receptors that result from helicopter emissions only, for each day during the 3-month period. In addition, ICF shall provide EPA with the helicopter activity data that was used in the model, by day and hour, to generate the lead concentrations; the data will include the number of helicopters (by engine type).

Task 6: Model 1-year at Reid-Hillview Airport using Constant Daily activity
Under this task, ICF shall model lead concentrations using the AERMOD model, using airport data and information collected and assembled under WA 3-66 under EPA contract EP-C-09-009. ICF

shall conduct 1-year (CY 2010) of modeling using constant daily (and hourly) activity as input to AERMOD. The only thing that should vary in this modeling should be the meteorology, which should reflect actual 2010 meteorology for the Reid-Hillview airport (and should be the same meteorology data used for Task 7 of WA 3-66). The quantity of daily aircraft activity (Landing and Takeoffs – LTOs) used shall be the average of the 365 daily LTO values used in the 1-year, task 7, modeling under WA 3-66. For each day, the hourly profile used shall be the weekday hourly profile used in WA 3-66 (i.e., even weekend days should use the weekday hourly profile). ICF shall use the gridded runway configurations and digitized terrain from the modeling domain constructed under WA 3-66. The emissions from other lead sources should also remain constant for the modeling in this task (i.e., the annual emissions from other lead sources shall be divided evenly amongst the 365 days).

The output data from the model simulations to be provided to EPA WAM shall include a data file that reports, for the entire year modeled (2010), the 24-hour average concentration of Pb from single-engine aircraft LTO on runway 31R separately from runway 31L, single-engine aircraft touch-and-go activity on 31R separately from 31L and twin-engine aircraft LTO on runway 31R separately from 31L, and a category called "other" that will include all other sources of Pb at a set of receptor points agreed upon and provided in written technical directions by the EPA WAM. This will result in seven concentration values being reported for each receptor site per day. This file shall also include the daily average wind speed, wind direction, and mixing height for the corresponding 24-hour period. Additional output that ICF shall provide from the modeling will include a table of the maximum 3-month average lead concentration that reports the concentrations of Pb per LTO attributed to single-engine aircraft on runway 31R separate from 31L, multi-engine aircraft on 31R separate from 31L, and touch-and-go flights on 31R separate from 31L. These concentrations shall be reported for the maximum impact site and receptors closest to the following distances downwind from the maximum impact site: 50, 100, 150, 200, 250, 300, 400, and 500 meters. ICF shall also report the minimum, maximum, and standard deviation around the values described above by evaluating the other 3-month rolling averages and the aircraft activity contributions from each runway. For the period with the maximum 3-month average concentration, ICF shall provide a table reporting the mean, minimum, maximum, and standard deviation of the 24-hour average lead concentrations (total $\mu g/m^3$ in the modeling domain from all sources) and aircraft source contributions (i.e., the six described immediately above) in units of $\mu g/ m^3$ per LTO at receptor sites at the distances described above (i.e., max impact site, 50 meters, 100 meters, 150 meters, 200 meters, 250 meters, 300 meters, 400 meters and 500 meters downwind from the maximum impact site).

Task 7: Finalize Reports

Under this task, ICF shall finalize the draft report, completed under and describing analyses conducted for WA 3-66 under EPA contract EP-C-09-009. The final report will document all aspects of WA 3-66, including the data collection efforts, emission inventory development, and modeling tasks. It shall summarize the results of the modeling tasks, and include conclusions about the model performance, the relative impact of aircraft emissions compared with other sources on local lead air quality concentration (e.g., roadway sources of Pb compared with avgas fueled aircraft sources) and the role of different aircraft modes of operation on local lead ambient air concentrations. The comments and edits ICF received from EPA during review of the draft report for WA 3-66 under EPA contract EP-C-09-009 shall be incorporated into this final report as appropriate.

The report shall also document all aspects of task 6 of this work assignment. ICF shall include in the final report color-coded isopleth plots of rolling 3-month average ambient Pb concentration similar to those provided in the draft final report for WA 3-66 under EPA contract EP-C-09-009 (i.e., for total Pb modeled in the domain). For the maximum 3-month average concentration period, ICF shall provide separate isopleth plots for each of three aircraft sources: (1) emissions from single-engine aircraft in full LTO, (2) emissions from single-engine aircraft conducting touch-and-go, and (3) emissions from twin-engine aircraft in full LTO (for both runways combined) as well as separate plots for single- and twin-engine aircraft use on runway 31R only. The final report shall also include information on the amount of daily activity (LTOs) used in the modeling, separated out by single-engine aircraft, twin-engine aircraft, and touch and go activity. The final report shall include the hourly activity profile used in this modeling.

Task 8: TSP Lead Monitoring and Vapor Phase Monitoring at One Airport

Under this task, ICF shall collect ambient air samples for lead in TSP and conduct monitoring for vapor-phase alkyl lead at San Carlos Airport in San Carlos, California.

TSP Lead Monitoring

ICF shall conduct 2 weeks of sampling at one location near the run-up area for runway 30. Sampling shall occur daily during airport operation hours, resulting in 14 sampling days per location, with 24-hr samples obtained from midnight to midnight. To meet this 24-hr schedule, two samplers will be needed at each sample location in order to allow personnel to change filters during daytime hours. Filter samples shall be changed out at approximately the same time on each of the days with the operating parameters documented in logs and on the sample chain-of-custody forms.

Mini-Vol samplers, manufactured by Aermetrics and operated in the TSP mode with only the rain caps and no impactors, shall be utilized at all sites. Nominal flow rates for Mini-Vols are 5 liters/minute. The samples shall be analyzed using the XRF (X-ray fluorescence) analysis method. Four blank samples per airport shall be carried through the process and analyzed during the program. Calibrations of all of the equipment shall be performed using certified flow standards. Lead and bromine samples shall be analyzed using X-ray Fluorescence (XRF) on Teflon® filters. Additionally, meteorological data shall be collected using a portable wind measurement system at a location near the air monitors, for the duration of the monitoring effort. Three meter vector wind speed and direction and scalar wind speed shall be recorded and reported in both 60-min and 5-min averages.

Vapor Phase Monitoring

In addition to the TSP lead monitoring, ICF shall include monitoring for volatile lead compounds, also near the run-up area for runway 30. Samples shall be obtained daily for ten days at 0700 – 2200 LST and 2200 – 0700 LST, representing daytime (airport normal operating hours) and nighttime airport activity (airport normally closed except for emergency landing). MiniVol samplers shall be used to collect the particulate lead as described above. Volatile alkyl-lead shall be collected using sorbent tubes. Sorbent tubes shall be collected in pairs, with one sorbent tube used for total volatile alkyl-lead, and one for speciated volatile alkyl lead. A suitable programmable pump shall be used for drawing sample air through the sorbent tubes. All volatile samples shall be analyzed by the Wisconsin State Laboratory of Hygiene, Environmental Health Division. Filter samples shall be analyzed using XRF.

Report

A draft and final report shall also be prepared for the lead air monitoring task as described above. The discussion and analysis shall include a summary of the potential range in contribution of alkyl lead to total lead concentrations for those locations where co-located monitors collected TSP lead and vapor phase alkyl lead as well as summary information on the monitored concentrations from the filter analyses, meteorological data collected, and documentation on any issues or problems that may have occurred during the data collection.

IV. SCHEDULE OF DELIVERABLES

The schedule for task deliverables is as follows:

Task 5 Deliverable: Helicopter 3-month modeling results	March 22, 2013
Task 6 Deliverable: Model 1 year of activity	March 22, 2013
Task 7 Deliverable: Final report	April 5, 2013
Task 8 Deliverable: Monitoring results and report	June 28, 2013

EPA

United States Environmental Protection Agency
Washington, DC 20460

Work Assignment

Work Assignment Number: 1-10

☐ Other ☒ Amendment Number: 000002

Contract Number	Contract Period	Title of Work Assignment/SF Site Name
EP-C-12-011	02/01/2012 To 09/30/2013 Base Option Period Number 1	Recording Aircraft Operations

Contractor	Specify Section and paragraph of Contract SOW
ICF INCORPORATED, L.L.C.	Task 7a

Purpose:
- ☐ Work Assignment
- ☒ Work Assignment Amendment
- ☐ Work Plan Approval
- ☐ Work Assignment Close-Out
- ☐ Incremental Funding

Period of Performance: From 10/02/2012 To 09/30/2013

Comments:

☐ Superfund — Accounting and Appropriations Data — ☒ Non-Superfund

Note: To report additional accounting and appropriations date use EPA Form 1900-69A.

SFO (*Max 2*) ☐

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

Authorized Work Assignment Ceiling

Contract Period:	Cost/Fee:	LOE:
02/01/2012 To 09/30/2013		
This Action:		
Total:		

Work Plan / Cost Estimate Approvals

	Cost/Fee:	LOE:
Contractor WP Dated:		
Cumulative Approved:		

Work Assignment Manager Name: Meredith Pedde (Signature) (Date)	Branch/Mail Code:	
	Phone Number: 734-214-4748	
	FAX Number:	
Project Officer Name: Greg Janssen (Signature) (Date)	Branch/Mail Code:	
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	FAX Number: 734-214-4821	
Other Agency Official Name: Jose Ortiz (Signature) (Date)	Branch/Mail Code:	
	Phone Number: 513-487-2831	
	FAX Number: 513-487-2109	
Contracting Official Name: Sandra Savage (Signature) (Date)	Branch/Mail Code:	
	Phone Number: 513-487-2046	
	FAX Number:	

PERFORMANCE WORK STATEMENT
CONTRACT NO. EP-C-12-011
WA 1-10 Amendment 2

Title: Recording Aircraft Operations at General Aviation Airports with Lead Monitors

Contractor:
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Period of Performance: October 2, 2012 – September 30, 2013

Background

Tetraethyl lead is used as an additive in aviation fuel for most piston-engine powered aircraft. Lead (Pb) emissions from the use of leaded aviation gasoline accounts for approximately half of the air emission inventory for lead. In October 2006, EPA received a petition from Friends of the Earth (FOE) requesting that the Agency find that aircraft lead emissions may reasonably be anticipated to endanger the public health or welfare, and to take action to control lead emissions from piston-engine aircraft. FOE also requested that if there was insufficient information, EPA should commence a study of the issue. This work builds on two earlier EPA work assignments and continues EPA's investigation and study of lead emitted by piston-engine aircraft and the potential impact on public health and welfare.

This work assignment builds on two previous work assignments: Work Assignment No. 0-10 under EPA contract EP-C-12-011 and Work Assignment No. 3-66 under EPA contract EP-C-09-009. However, the contractor shall not duplicate any work previously performed.

EPA is amending WA 1-10 to add Task 9. The Performance Work Statement is amended as follows to add Task 9. Task 9 adds the following work: collection and preparation of meteorological data from US airports.

TASKS

Task 9: Collection of NCDC Meteorological Data

For EPA to evaluate the most frequently used runway end at airports across the country ICF shall download NCDC 1-minute Automated Surface Observing System (ASOS) data (available at: ftp://ftp.ncdc.noaa.gov/pub/data/asos-onemin/) for all sites that have data for 2011 and January – March 1, 2012 (March 1, 2012 is needed in order to capture all of February 2012, given that the standard Integrated Surface Hourly Data (ISHD) is in GMT and AERMET converts to local time). The 1-minute ASOS data shall then be run through AERMINUTE to generate hourly averaged wind speed and wind direction data by station, day, and hour for the 424 days. For hours without ASOS data, ICF shall replace that observation with the standard hourly ASOS observation so that there are hourly observations for each station – day – hour record in the dataset. The standard hourly ASOS data can be processed through AERMET stage 1 to make it easier to read standard observations and to merge hours.

An example of one record of desired data output is shown below:

ASOS Station NCDCID	ASOS Station Call	ASOS Station Name	Year	Month	Day	Hour (LST)	Wind Speed	Wind Direction	Data Source (either STD or AER)
20019437	FRG	Farmingdale AP	2012	1	1	1	2.34	300	STD

ICF shall organize the data such that it is contained in multiple excel files; each separate excel file shall contain the data for 50 ASOS stations. It will therefore contain ~500,000 records (50 ASOS stations X 424 days X 24 hours = 508,800).

SCHEDULE OF DELIVERABLES

The schedule for task deliverables is as follows:

Task 9 Deliverable: Meteorological Data Collection August 16, 2013